ANNUAL MANAGEMENT REPORT KUSKOKWIM AREA, 1987

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[1] The Regional Information Report Series was established in 1987 to provide an information access system for all unpublished divisional reports. These reports frequently serve diverse ad hoc informational purposes or archive basic uninterpreted data. To accommodate needs for up-to-date information, reports in this series may contain preliminary data.

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TABLE OF CONTENTS

	Page
LIST OF TABLES	v
LIST OF FIGURES	vii
LIST OF APPENDICES	viii
PREFACE	1
PART I. SALMON FISHERY	
INTRODUCTION	
Area and District Boundaries	3
District 1	3
District 2	3
District 4	3
District 5	3
Fishery Resources	4
Management Programs	4
SEASON SUMMARY	8
Kuskokwim River	8
Chinook Salmon	8
Sockeye and Chum Salmon	14
Coho Salmon	15
Kuskokwim River Summary	17
Quinhagak, District 4, All Salmon Species	21
Goodnews Bay, District 5, All Salmon Species	24
Subsistence Fishery	26
OUTLOOK FOR 1988	30
Chinook Salmon	30
Sockeye Salmon	31
Chum Salmon	31
Coho Salmon	32
Freshwater Fin Fish Fishery	32
Subsistence Fishery	33
Commercial Fishery	33
Status of the Stocks	35
PART II. HERRING FISHERY	35
INTRODUCTION	35
SEASON SUMMARY	38

TABLE OF CONTENTS (Continued)

	PAGE
Stock Status	41
Assessment Methods	42
Spawning Populations	42
Security Cove District	42
Goodnews Bay District	44
Central Kuskokwim Bay Area	45
Nelson Island District	45
Nunivak Island District	47
SUBSISTENCE FISHERY	48
COMMERCIAL FISHERY	48
Security Cove District	48
Goodnews Bay District	51
Nelson Island District	52
Nunivak Island District	54
OUTLOOK AND MANAGEMENT STRATEGY FOR 1988	57
Security Cove District	58
Goodnews Bay District	58
Nelson Island District	59
Nunivak Island District	60
Cape Avinof District	60
LITERATURE CITED	62

LIST OF TABLES

TABLE		PAGE
1.	Kuskokwim Area commercial and subsistence salmon catches by species and district, 1987	64
2.	Value of Kuskokwim area commercial salmon harvest, 1987	65
3.	Peak aerial survey salmon escapement estimates in Kuskokwim spawning tributaries by species, 1987	66
4.	Lower Kuskokwim River, District 1, commercial harvest by species and fishing effort by period, 1987	67
5.	Middle Kuskokwim River, District 2, commercial harvest by species and fishing effort by period, 1987	68
6.	Quinhagak commercial harvest by species and fishing effort by period, 1987	69
7.	Goodnews Bay commercial harvest by species and fishing effort by period, 1987	70
8.	Reported and estimated total subsistence harvest in the sampled villages by species, 1987	71
9.	Estimated incidental chinook salmon catch in District 1 on 24 and 30 June, 1987	72
10.	Estimated total subsistence salmon harvest from Kuskokwim River, 1987	73
11.	Kuskokwim Bay subsistence salmon fishery summary, 1987	74
12.	Estimated biomass and commercial harvest of Pacific herring in Kuskokwim Area fishing districts, 1987	75
13.	Number of buyers and fishermen participating in Kuskokwim Area Pacific herring fisheries, Alaska, 1981-1987	76

LIST OF TABLES (continued)

PAGE

14. Pacific herring subsistence harvest (st) and effort data from selected Kuskokwim Area, Alaska, 1975-1987..... 77

15. Pacific herring commercial fishing period summary of Kuskokwim districts, Alaska, 1987..... 78

16. Pacific herring minimal spawning biomass and harvest projections for commercial fishing districts in the Kuskokwim Area, Alaska, 1988..... 79

LIST OF FIGURES

FIGURE		PAGE
1.	Kuskokwim Area Map.....	80
2.	Kuskokwim Management Area, District W-1.....	81
3.	Kuskokwimm Management Area, District W-2.....	82
4.	Kuskokwim Management Area District W-4, Quinhagak, 1987.....	83
5.	Kuskokwim Management Area District W-5, Goodnews Bay, 1987.....	84
6.	Kuskokwim drainage aerial chinook salmon escapements index, 1987.....	85
7.	Goodnews Bay and Security Cove Herring District, 1987.....	86
8.	Nelson Island Herring District, 1987.....	87
9.	Nunivak Island Herring District, 1987.....	88
10.	Herring age structure, Kuskokwim Area, 1987.....	89
11.	Kuskokwim Management Area, Cape Avinof District, 1987.....	90

LIST OF APPENDICES

APPENDIX A — Page

A-1 Kuskokwim Area escapement index objectives for chinook, sockeye, coho and chum salmon..... 91

A-2 Estimated dollar value of Kuskokwim Area commercial salmon fishery, 1964-1987..... 92

A-3 Kuskokwim Area commercial and subsistence salmon catches, 1913-1987..... 93

A-4 Historic salmon escapement data from current Kuskokwim Area projects, 1976-1987..... 95

A-5 Lower Kuskokwim River, District 1, and middle Kuskokwim River, District 2, commercial effort, 1970-1987..... 96

A-6 Kuskokwim Area subsistence chinook salmon harvest by village, 1960-1987..... 97

A-7 Kuskokwim Area subsistence "small" salmon harvest by village, 1960-1987.....101

A-8 Mean salmon weights and prices paid to commercial fishermen, Kuskokwim Area, 1967-1988.....105

A-9 Fishes commonly found in the Kuskokwim Area, 1987.....106

A-10 Kuskokwim River distances, 1987.....107

A-11 Swimming speed, 1987.....109

A-12 Commercial freshwater fin fishery catch data, Kuskokwim Area, 1977-1987.....110

APPENDIX B

B-1 Associated environmental and catch data, Bethel, Kuskokwim River, 1965-1987.....111

B-2 Comparative chinook salmon catches by fishing period by year in District 1, Lower Kuskokwim River 1974-1987.....112

B-3 Comparative sockeye salmon catches by fishing period by year in District 1, Lower Kuskokwim River 1981-1987.....117

LIST OF APPENDICES (continued)

APPENDIX B PAGE

B-4 Comparative chum salmon catches by fishing period by year in District 1, Lower Kuskokwim River 1981-1987...119

B-5 Lower Kuskokwim River, District 1, and the middle Kuskokwim River, District 2, combined commercial salmon harvest, 1960-1987.....123

B-6 Kuskokwim River escapement of chum salmon by age and sex, 1982-1987.....124

B-7 Kuskokwim River commercial and subsistence chum salmon catch by age and sex, 1982-1987.....126

B-8 Kuskokwim River chinook salmon cumulative mean tidal test fishing CPUE and percent by day, 1984-1987.....128

B-9 Kuskokwim River sockeye salmon cumulative mean tidal test fishing CPUE and percent by day, 1984-1987.....130

B-10 Kuskokwim River coho salmon cumulative mean tidal test fishing CPUE and percent by day, 1984-1987.....132

B-11 Kuskokwim River chum salmon cumulative mean tidal test fishing CPUE and percent by day, 1984-1987.....134

B-12 Commercial coho salmon catches by week, lower Kuskokwim River (District 1), 1974-1988.....136

APPENDIX C

C-1 Historical age composition percentage, chinook salmon, Quinhagak commercial harvest and escapement, 1982-1987.....140

C-2 Kanektok River peak aerial surveys by species, 1959-1987.....142

LIST OF APPENDICES (Continued)

PAGE

C-3 Historical age composition percentage, sockeye salmon, Quinhagak commercial harvest and escapement, 1982-1987..... 143

C-4 Historical age composition percentage, chum salmon, Quinhagak commercial harvest and escapement, 1982-1987..... 145

C-5 Historical commercial harvest by period, Quinhagak District, sockeye salmon, 1981-1987..... 147

APPENDIX C

C-6 Historical commercial harvest by period, Quinhagak District, chum salmon, 1981-1987..... 149

C-7 Quinhagak District commercial salmon harvest, 1967-1987..... 151

C-8 Historical commercial harvest by period, Quinhagak District, chinook salmon, 1981-1987..... 152

C-9 Quinhagak District commercial salmon effort, 1970 - 1987..... 154

APPENDIX D

D-1 Peak aerial survey results, Goodnews River, 1979-1988..... 155

D-2 Historical age composition percentage, chinook salmon Goodnews Bay commercial harvest and escapement, 1982-1987..... 156

D-3 Historical estimated run size and commercial exploitation rate, Goodnews River, 1981-1987..... 159

D-4 Historical age composition percentage, sockeye salmon Goodnews Bay commercial harvest and escapement, 1982-1987..... 160

D-5 Goodnews Bay District commercial salmon harvest, 1968-1987..... 163

LIST OF APPENDICES (Continued)

		PAGE
D-6	Average cumulative percent of estimated escapement by day for chinook, sockeye and chum salmon, Goodnews River counting tower project, 1981-1987.....	164
D-7	Historical age composition percentage, chum salmon, Goodnews Bay commercial harvest and escapement, 1982-1987.....	166

This is the twenty-seventh annual management report detailing the management activities of the Division of Commercial Fisheries staff in the Kuskokwim Area. The 1960-1974 management reports for the "Kuskokwim District" appear in the Arctic-Yukon-Kuskokwim Area reports series. The 1975-1986 management reports appear in the Kuskokwim Area Annual Report series. This report is the first annual management report to appear in the Regional Information Report Series.

Data presented in this report supersedes information found in previous management reports. This report includes summary data from many special research projects. Complete documentation of these projects and results appear in separate reports. Some of the data presented is preliminary and may result in minor differences in future catch and escapement data reports.

Subsistence catch estimates for the years before 1978 are different from the estimates presented in the Kuskokwim Area Annual Management Reports for 1978 through 1984. The historical tables were "corrected" in 1978. The method and the reason for the correction was not recorded. In an effort to standardize the subsistence catch data, the estimates originally reported in the Management Reports before 1978 have replaced the "corrections".

To simplify use of this report, the tabular data are separated into current year tables and appendix tables where annual comparisons were made. Total fishermen hours are the total number of fishermen delivering (the number of unique CFEC permit numbers used) multiplied by the total number of hours open to commercial fishing. The resulting catch divided by the number of fishermen hours during the fishing period equals catch per fisherman hour (C.P.U.E.).

"Total fishermen" is the term used to represent the total number of fishermen who made at least one delivery during a particular interval. There are many area fishermen who deliver only once or twice during each season.

Computer tabulations of fish tickets provide the commercial catch data.

PART I. SALMON FISHERY

INTRODUCTION

Area and District Boundaries

The Kuskokwim Area includes all waters of Alaska between Cape Newenham and the Naskonat Peninsula, plus Nunivak and St. Matthew Islands (Figure 1). Commercial salmon fishing occurs in four districts in the area:

District 1 consists of the Kuskokwim River from a line from Apokak Slough to Popokamiut upstream to Mishevik Slough (Figure 2) these boundaries have been in effect since 1985.

District 2 consists of the Kuskokwim River from Mishevik Slough upstream to the Kolmakoff River near Aniak (Figure 3) these boundaries have been in effect since 1966.

District 4 consists of the waters of Kuskokwim Bay between Oyak Creek and the Arolik River adjacent to the village of Quinhagak (Figure 4) these boundaries have been in effect since 1960.

District 5 has consisted of the waters of Goodnews Bay (Figure 5) since 1968. These districts correspond to the local geography and distribution of the five species of salmon harvested by the subsistence and commercial fishery.

Fishery Resources

Five species of Pacific salmon are indigenous to the area; chinook or "king" salmon (Oncorhynchus tshawytscha), sockeye or "red" salmon (O. nerka), coho or "silver" salmon (O. kisutch), pink or "humpback" salmon (O. gorbuscha) and chum or "dog" salmon (O. keta). The Kuskokwim River drainage has the largest populations of chinook, sockeye, coho and chum salmon in the area. Pink salmon are widely distributed throughout the area, but the lack of both commercial markets and interest by subsistence fishermen, along with the absence of stock monitoring projects has resulted in little quantitative data on the population size of this species. The management objective for all districts is to achieve desired escapement objectives and allow for the orderly harvest of fish surplus to spawning requirements, including assignment of subsistence as the highest priority among beneficial uses of the resources.

Management Programs

The vast size of the area and the turbid nature of many streams make accurate estimates of the size of salmon returns and the spawning escapements difficult to obtain. Most of the fisheries have been expanding since their initiation. Fishery management

is also hampered by the relative lack of comparative catch and total return information. The management of the commercial fishery is further complicated because of the need to provide sufficient escapement for the important subsistence fishery and for spawning purposes. In recent years as the data base for the various escapement projects has expanded, it has become possible to use the migratory timing of the salmon for in-season management.

It has been a management strategy to conservatively increase the recent levels of commercial utilization in developing commercial fisheries for a few years in order to establish definite trends in the relationship between catch and escapement. If the escapement indices do not suggest a declining population and subsistence needs are satisfied, then the commercial harvest guideline is increased. The historic production of the district, the combination of subsistence and commercial catches and escapement indices, is used to establish the commercial harvest guidelines. In all districts, this policy appears to have reached sustainable harvest levels for most stocks, with the possible exception of Kuskokwim River sockeye salmon, Kuskokwim Bay coho salmon and pink salmon through out the area.

Adjustments of the commercial fishing time allowed and the time between periods are the primary methods of distributing the

harvest throughout the return. This avoids over-harvesting discrete stocks and allows staying within the harvest guidelines, achievement of escapement objectives and allows sufficient fishing time for the subsistence fishery. Commercial fishing periods vary between 6 and 12 hours in length depending on the species, effort and return magnitude.

Adjustments of commercial fishing time are made during the season in response to return magnitudes shown by commercial catch data and by various Department field studies. A recently established Department test fishing program near Bethel provides an index of abundance and return timing. Annual escapements are evaluated by: (1) aerial surveys of "key" spawning streams and lakes throughout the area; (2) a weir project in the Holitna River drainage; (3) sonar counters on the Aniak and Kanektok Rivers;(4) a counting tower on the Goodnews River.

The area's major spawning systems received provisional salmon spawning escapement objectives in 1983. These objectives are an average of aerial survey indices obtained in these systems under good to fair survey conditions since 1960 (Appendix A-1). Only counts obtained under good to fair survey conditions were used. Indices obtained under poor conditions (primarily turbid water) were excluded.

The only attempt made to qualify the indices was to remove an unusually large chum salmon survey from the average calculation

for the Tuluksak River. In 1987 we discovered a similar unusually large chum salmon count in the Kanektok River data base was biasing the average. The 1978 chum count (Appendix C-2) was obviously exceptional. Excluding it from the index calculation resulted in a change in the objective for chum salmon in the Kanektok River from 54,000 to 30,500.

The objectives represent escapement levels needed to maintain the salmon returns at recent historic levels and may require future adjustment to maximize salmon production. Expansion of the escapement assessment program continues to be a priority.

Communicating management plans and decisions to the local public presents a special challenge because many of the people cannot read or speak English, or more often English is a second language. Translation is often necessary, but accurate translations are difficult, particularly under the sometimes stressful conditions that occur during the commercial fishery. Additionally, many special regulation notices are broadcast over local radio stations in both English and Yup'ik languages. A weekly English language fishery program is broadcast over radio station KYUK in Bethel. The program provides information on regulations, biology, and fisheries management throughout the year.

SEASON SUMMARY

The total 1987 Kuskokwim Area season commercial salmon catches (District 1, 2, 4 and 5) consisted of 65,558 chinook, 170,849 sockeye, 478,594 coho, 163 pink and 603,274 chum salmon (Table 1). A record 798 permit holders participated in the Kuskokwim area fishery this year (Appendix A-2). The total amount paid to fishermen was $6,393,000 (Appendix A-2). In 1987 the average Kuskokwim permit holder earned $8,011(Appendix A-2). This is the highest total catch value and income per fisherman in the history of the fishery. Record prices for all species except chum salmon and the second largest harvest were responsible for the high value of the catch.

Kuskokwim River

Chinook Salmon

To provide for a subsistence harvest that has averaged 51,000 chinook salmon during the past five years and to maintain average spawning escapements, management of commercial chinook salmon fishery in the Kuskokwim River was very restrictive in 1987. Representatives of the commercial and subsistence fishermen, processors, and the Department developed a management plan. The Alaska Board of Fisheries accepted and adopted the plan. The plan had three objectives:

1) to halt the decline in the chinook salmon escapement and to allow escapements of average magnitude;

2) to allow the traditional subsistence chinook salmon fishery to occur without new restrictions;

3) to allow the harvest of sockeye and chum salmon that run coincidentally with the chinook salmon.

The plan was successful. Chinook salmon escapement approached the objective level for the first time since 1982. The subsistence fishery proceeded normally. Sockeye and chum salmon harvests were at record levels.

This is in contrast to the earlier management strategies used from 1972 through 1986 that resulted in an over-harvest of chinook salmon in eight of those 15 years. The Board of Fisheries adopted major changes in regulations in 1984 to solve the dilemma. These regulations reduced the commercial harvest by a third to one-half by establishing a 15 - 30,000 chinook salmon harvest guideline. Gill nets were restricted to 6-inch or smaller mesh size for the entire season to reduce the harvest of the larger female chinook salmon. However, these changes did not stop the decline in escapement in 1985 and 1986 (Figure 6).

The strategy used in 1987 continued to require the use of 6-inch or smaller mesh nets to concentrate the harvest on the smaller "jack" chinook salmon. In addition, the plan provided for three 8-hour fishing periods scheduled 6 days apart to insure that the chinook salmon not caught during the opening would have adequate time to travel through the 132 mile length of District 1 before the next opening. This schedule also guaranteed the fishermen and processors that there would be the average 24 hours of commercial fishing in June in which to harvest sockeye and chum salmon.

The second change limited commercial fishing to downstream of Bethel during the 18 August opening. This provision prevented the harvest of the earlier running chinook salmon in the upstream portion of the district when the later running sockeye and chum salmon had not yet reached this part of the district.

The final change in the strategy was to allow the sale of only 14,000 chinook salmon during the June fishery. This provision was made to encourage commercial fishermen to avoid catching chinook salmon and to instead target on the sockeye and chum salmon.

Representatives of the Western Alaska Salmon Coalition, Lower

Kuskokwim Fishermen's Co-op, Association of Village Council Presidents, Nunam Kitlutsisti, the Lower Kuskokwim Fish and Game Advisory Committee, two of the processors and the Department collaborated in an informational program to explain the "June Kuskokwim King Salmon Management Plan". This program included posters, CB network discussions, radio and television programs. The subsistence fishery proceeded normally with the first chinook salmon taken on 25 May (Appendix B-1).

The Department test fishery showed that 38 percent of the chinook salmon run had past Bethel by the 18 June opening (Appendix B-8) compared with 7 percent of the chum salmon (Appendix B-11) and 28 percent of the sockeye salmon (Appendix B-9).

As required by the plan to protect the earlier migrating chinook salmon, District 1 was open to commercial fishing downstream of Bethel for 8 hours on 18 June. There were 19,126 chinook, 9,508 sockeye and 14,137 chum salmon taken in that opening (see Table 4). The chinook salmon catch exceeded the 14,000 allowable for sale for this species, and chinook salmon sales were prohibited for the rest of June.

The chinook salmon catch on the 18th was remarkable in several ways. An in-season sample aged by length showed that 43 percent of the catch was 3 and 4 year old chinook salmon and by scale

aging 47 percent age-4 (Huttunen, personal communication). In 1985 and 1986, when the gear restrictions were the same, age-3 and 4 chinooks composed fewer than 28 percent of the commercial catch. This large proportion of jacks also appeared in the sex ratio of the catch which was 77 percent male compared with 62 to 66 percent in 1985 and 1986 (Huttunen 1987 and personnel communication). Both test fishing and reports by subsistence fishermen indicated that the chinook salmon run was stronger than that experienced in recent years (Appendix B-8). The strong run combined with the record $1.10 per pound (Appendix A-8) price for chinook salmon resulted in some dissatisfaction with the plan.

The fishery proceeded as outlined in the plan with later openings six days apart on 24 June and 30 June. Sockeye and chum salmon catches increased steadily during these periods (Table 4).

District 2 remained closed in June. This was necessary because District 2 had inadvertantly not been included in the plan. As a result, chinook salmon sales were still legal in that district. Permits are freely transferable between districts and salmon taken in District 2 are often delivered to tenders and processing plants in District 1. Therefore, opening District 2 would have created a circumstance similar to the 1981 season when District 2 opened while District 1 remained closed. A

record one hundred and fifty-one boats fished in the district (Appendix A-5). The 3,900 chinook salmon that were harvested during that period exceeded the harvest guideline for District 2 (Jonrowe 1982). District 2 remained closed until July when chinook salmon sales were again legal in both districts. Both the chinook and chum salmon harvest guidelines in District 2 (2,000 and 8,000) were taken in two six hour periods on 3 and 7 July (Table 5).

Interviews with fishermen making deliveries on 24 and 30 June and a questionnaire mailed in September to all the fishermen who made deliveries during those two openings provided two estimates of the incidental chinook salmon harvested. The estimated catch on 24 June was 12,119 to 13,615 chinook salmon (Table 9). On 30 June, the catch estimate dropped to between 5,831 and 6,555 chinook salmon (Table 9). The total estimated catch was 17,950 to 20,170 chinook salmon (Table 9). Neither the people interviewed or responding to questionnaires reported dumping fish. Several people reported hearing of some fish wastage and two people have told us they had to dump fish.

A special effort was made by some concerned people in Bethel to establish a well advertised receiving beach where fishermen could give unwanted chinook salmon to charities and people needing fish. Various charities had requested 2,000 chinook salmon, but only about 200 fish were brought to the beach for disposal.

Several fishermen reported success at "rolling" chinook salmon out of their nets alive; many comments on the large number of net marked fish from both commercial and subsistence fishermen were received. Some waste occurred. The larger than average subsistence chinook salmon catch and the drop in the small salmon catch suggests that most fish were utilized (Appendix A-6, A-7).

Sockeye and Chum Salmon

By 1 July, the continuing strong sockeye and chum catches by the commercial and test fishery and the high passage rates at Aniak sonar indicated that chum salmon escapements would be adequate. An overharvest of the chum occurred in the two years following the shift to using the entire length of District 1 during the chum salmon run. In 1987, the interval between openings increased to 4 days to allow the unharvested fish to escape the district and avoid an overharvest. The period on 3 July was an exception since it followed the period on the 30th by only 3 days. This was done because the chum salmon run was peaking and to avoid the 4th of July holiday.

Large catches continued until 13 July; the test and commercial fisheries and the sonar projection continued to show that the

chum salmon escapement would reach objective levels. Following the opening on 15 July, sonar counts and test fishery index trends suggested a decline in escapement levels. In response, we announced the next opening for the 20 July, a five day separation and the latest opening in the fisheries history. This was done because of a late strong showing of chum salmon in the test fishery (Appendix B-11) that had not yet had time to reach the escapement project. Area staff projected that the lag in escapement would improve with the arrival of the latter running chum salmon. The commercial catch was large on 20 July (Appendix B-4), but following the period the chum catch in the test fishery dropped off (Appendix B-11) and escapement continued to decline. The fishery did not reopen until 6 August when coho salmon were the primary species present.

Coho Salmon

The brood year, 1983, of the 1987 coho salmon return was the only year which failed to achieve escapement objectives since 1979 (Appendix A-4). The incidental coho salmon catch during the chum salmon fishery in 1987 was well below normal even though the chum salmon fishery continuing later than it ever had previously. The catch on 6 August was below the previous years' catch for that date (Appendix B-12). The test fishery also continued to show a weak run (Appendix B-10).

Uncertainty about the indicators resulted in the announcement of a 3-hour test opening for 13 August. Subsistence catch reports, late in the day on 11 August, showed that coho salmon were beginning to enter the district in good numbers. By 12 August test fishing catches were improving and a normal 6-hour period replaced the test opening. The catch of 104,968 coho salmon on the 13th was the largest catch in a single 6-hour period in the history of the river (Appendix B-12).

The announced 3-hour test opening which departed from the normal fishing schedule resulted in considerable controversy. Representatives of various fishing groups met with the Department on 14 August. The fishermen requested 3 commercial periods a week - a departure from the normal twice a week schedule. During the 1986 record coho salmon run, we had used a three period a week schedule at the peak of the run to relieve a processing capacity problem to avoid fish wastage. The more frequent fishing schedule had been poorly received by fishermen, for this reason the department had not considered a repeat of it. In response to this request, on 14 August the Department did announce three 6-hour periods on Monday, Wednesday and Friday during the week of 17 August. The Department felt the strength shown by the test fishery and commercial catch and the potential for run compaction caused by the run's lateness would prevent an overharvest. District 2 was also re-opened coincidentally with District 1 since the subsistence catch

reports indicated that the chum salmon had passed out of the district. The Department subsequently received a petition from Atmauthluak and many telephone calls complaining about the three period a week schedule. Since the peak of the run had past following the third opening, the fishery returned to the normal twice a week schedule.

District 2 closed following the 18 hours of fishing allowed from 13 through 19 August. The catch was 9,600 coho salmon (Table 5) which exceeded the harvest guideline of 2,000 to 4,000 coho salmon. During recent years with large coho salmon returns, the catches have exceeded the harvest guideline. The guideline is about 2 percent of the average coho salmon harvest in District 1. During above average returns District 2 harvest has continued to about 2 percent of the total harvest.

Test fishing and commercial catches continued to be above average through the remainder of August. As a result, the fishing continued beyond the regulatory closure of 1 September with two periods on 3 and 7 September.

Kuskokwim River Summary

The commercial harvest in District 1 was 33,907 chinook, 134,631 sockeye, 385,321 coho, 41 pink and 566,499 chum salmon (Table 4). In District 2, the commercial catch was 2,272 chinook,

1,971 sockeye, 9,575 coho, 2 pink, and 7,797 chum salmon (Table 5). The chinook salmon catch was slightly above the previous 5-year average of 34,091 (Appendix B-5). The sockeye salmon catch of 136,602 was the largest on record (Appendix B-5). The coho salmon catch was below the previous five year average but, was the fourth largest on record (Appendix B-5). The below average catch was an artifact caused by the large catches in 1982, 1984, and 1986 dominating the average. The chum salmon catch of 570,540 was the largest catch on record (Appendix B-5).

The estimated subsistence harvest was 67,325 chinook salmon, bringing the combined subsistence and commercial catch to 103,504 chinook salmon (Table 1). Chinook salmon aerial survey escapement indices in the Kuskokwim River were just slightly below escapement objectives (Figure 6). Unfortunately, high water prevented obtaining an index of chinook escapement at the Kogrukluk weir since it was not operational during the chinook, sockeye, and chum salmon migrations.

The commercial catch of chum salmon was a record 574,336 fish (Appendix B-5). The subsistence catch of small salmon (predominately chum) of 98,781 fish (Table 10) suggests a continued decline in the subsistence utilization of this species (Appendix A-7). The escapement index at Aniak sonar was only 74 percent of the objective (Appendix A-4). The aerial survey

index was also low; however, the quality of the surveys was poor because of water color. The Aniak sonar count probably represents a relative index of the condition of the drainage's chum salmon escapement. In addition, the Central Kuskokwim Advisory Committee reported that the chum salmon run appeared weak.

The attempt to reverse the below objective chum salmon escapements by increasing the time between fishing periods did not work. In 1985 the Board of Fisheries requested that the entire 132 mile length of District 1 (Appendix A-10) be opened during the chum fishery (except for the previously mentioned shorter district to protect chinook salmon). In 1985 and 1986 the traditional Monday-Thursday commercial fishing schedule applied to the entire length of District 1. Chum salmon failed to reach escapement objectives in both of those years (Appendix A-4).

The primary reason that chum salmon overharvest has occurred even when the time between periods has been increased may be that chum salmon swimming speed was overestimated. Appendix A-11 presents the available information on salmon swimming speed in the Kuskokwim River. The average chum salmon swimming speed ranged from 6.2 to 13.7 miles per day. All the studies suggested that the measured swimming speeds were low because of tagging shock. The test fishery found chum salmon were

traveling faster (about 25 miles a day) than the tagging studies showed (Huttunen 1984, 1985, 1986, 1987).

Previously commercial fishing periods on Monday and Thursday in the 60 miles of District 1 below Bethel allowed adequate escapement in most years. The 60 miles of District 1 represents about two days of travel time for the chum salmon. This insured that all the fish not caught in the commercial opening on Monday escaped the opening 2 days latter on Thursday. The longer 3 day closure between Thursday and Monday not only allowed the fish not caught on Thursday to escape but allowed roughly one day's entry of fish to pass through the district, avoiding any commercial fishing periods.

Using the entire length of the district has increased the travel time to about 5 days (using 25 miles a day). Increasing the time between fishing periods to 4 days did not allow any fish to avoid commercial fishing. However, the Department felt spreading the fleet over the length of the district would provide a compensatory reduction in effort. The chum escapements in 1987 showed that a 4 day separation of fishing periods did not provide an adequate reduction in effort to compensate for the increased catch caused by exposing the same fish to two commercial openings.

Travel time is uncertain and appears to be variable depending on several elements (run timing, stage of the run, weather etc). Commercial periods spaced 5 to 6 days apart would duplicate the commercial fishing exposure experienced before 1985.

The escapement of coho salmon at Kogrukluk weir approached the objective of 25,000 with an estimate of 24,500. Postseason observations by subsistence fishermen and Department personnel also imply that adequate escapement occurred. The difficulties in coho salmon management in 1987 were a result of their uncharacteristic late run timing (Hamner 1986, Appendix B-10) and the Department's concern that the run would be weak because of the poor brood year escapement (Appendix A-4).

Quinhagak, District 4, All Salmon Species

Quinhagak, District 4 (Figure 4) opened for the first period in 1987 on June 18. The first five commercial openings were chinook salmon targeted periods (Table 6). The second 12 hour period on 22 June resulted in a season total catch of 18,000 chinook salmon (Table 6). The management strategy in this district has been to only allow the chinook harvest to exceed 15,000 fish if adequate escapements are occurring. Effort levels had also increased dramatically. The fishing periods in District 1 in June were part of the regulations so fishermen

could plan their movement between districts. The prohibition of chinook salmon sales in District 1 also contributed to fishermen switching districts. As a result many District 1 fishermen were also fishing in District 4. Six hour periods on 25 and 30 June prevented a possible overharvest of chinook salmon. The catch on 25 June was typical in spite of the reduced fishing time (Appendix C-8). The chinook salmon catch on 30 June was surprisingly low (Appendix C-8) suggesting the end of the chinook salmon run. The chinook salmon catch was below the previous five year average catch, continuing the decline from the record catch in 1983 (Table 9). The chinook salmon escapement was below objectives with 73 percent of the desired objective of chinook salmon seen in aerial surveys conducted.

The chum salmon catches were similar to the 1983 brood year catches (Appendix C-6). The 1983 brood year did not achieve the escapement objective (Appendix C-2). Sockeye salmon catches appeared similar to the catches seen since 1983 (Appendix C-5). Escapement objective were not reached in any of those years (Appendix C-2). The concern was that both the sockeye and chum salmon runs were weak. A normal 12 hour period on 3 July showed that the low catches were not caused by the reduction in fishing time to protect chinook salmon. Catches of both species remained low and commercial fishing ceased until escapement could be determined.

Frequent aerial surveys continued to show low chum salmon escapements. Indications of a poor chum salmon return resulted in a total closure of commercial fishing from 3 July to 3 August. Even with the elimination of commercial fishing during most of the chum salmon migration, Kanektok River escapements were only 17 percent of objectives for chum salmon (Appendix C-2). The chum catch of 8,557 was only 27 percent of the five year average of 31,394 (Appendix C-7). Despite the elimination of commercial fishing during most of July the chum salmon escapement failed to reach the objective for the third consecutive year.

With the total commercial fishing closure in July to increase chum salmon escapement, sockeye salmon escapement also benefited. In 1987 the sockeye salmon escapement exceeded the objective by 62 percent (Appendix C-2). The sockeye salmon harvest was 6,489, which only represents 39 percent of the five year average of 16,513 (Appendix C-7).

The fishery continued in August for coho salmon on a two, then later a three 12 hour period per week schedule until the regulatory closure on September 8. The last period had no effort because no buyers were in the district (Table 6). The coho salmon catch of 50,070 was 75 percent of the previous five year average, but was still the fifth largest harvest in the

history of the fishery (Appendix C-7). Coho salmon escapement met the escapement objective in 1987 (Appendix C-2).

The commercial catch in Quinhagak, District 4 totaled 26,022 chinook salmon, 6,489 sockeye, 50,070 coho, 66 pink and 8,557 chum salmon (Table 6). The 1987 subsistence harvest is within normal range experienced for Quinhagak for the past 5 years (Table 8).

A near record 310 fishermen made at least one delivery in Quinhagak, District 4, in 1987 (Appendix C-9), well above the 5 year average of 246. Effort peaked on 22 June with a record 253 boats fishing District 4 during a 12 hour period (Table 6). This increase, as discussed above, resulted from shift in effort from the Kuskokwim River districts.

Goodnews Bay, District 5, All Salmon Species

The commercial fishery in Goodnews Bay, District 5 opened for the first period on 18 June in 1987. During the month of June, the fishery primarily targets chinook salmon. Chinook salmon escapements past the tower suggested a weak run. By reducing fishing periods to one 12-hour period per week during the month of June, the harvest was reduced and escapements were enhanced (Table 7).

The fishery continued into July and increased to two 12 hour periods a week until 20 July. During July, the primary species migrating through the district is sockeye salmon. Lagging sockeye salmon escapement resulted in a fishery closure from 20 July until 3 August. Sockeye salmon escapement objective was reached (Appendix D-1).

The Goodnews Bay District reopened on August 1 in anticipation of the coho salmon run. Both sockeye and chum salmon catches were larger than the coho salmon catch (Table 7). The fishery closed until 10 August to allow the coho salmon run to increase. The catch on 10 August was predominantly coho salmon (Table 7) and the normal 3 commercial fishing periods a week schedule began. The fishery closed by regulation on September 8 following a fishing period that had no effort because no buyers were in the district (Table 7).

The Goodnews River salmon counting tower project operated from 22 June through 30 July 1987. The first week of operation had poor counting conditions caused by high turbid water. Some interpolation in determining final estimate of salmon during days of partial counts caused by turbid waters was necessary. The 1987 tower escapement estimates were: 2,274 chinook, 28,871 sockeye, and 17,519 chum salmon (Appendix D-3). The escapement objective for the project is 3,000 to 4,000 chinook, 35,000 to 45,000 sockeye and 13,000 to 18,000 chum salmon.

The Goodnews Bay commercial catch in 1987 totaled 3,357 chinook, 27,758 sockeye, 29,057 coho, 54 pink and a record 20,381 chum salmon (Appendix D-5). The 1987 harvest of sockeye and chum salmon was above the previous five year (1982-1986) average (Appendix D-5). Chinook, coho and chum salmon were below the previous five year average (Appendix D-5). Effort in this district reached a new record level of 116 fishermen compared with the previous 5 year average of 72 fishermen (Appendix D-9). The Division of Commercial Fisheries has annually conducted subsistence salmon harvest surveys since 1977 in Goodnews Bay. The 1987 subsistence harvest is within the normal range experienced for Goodnews Bay during the past five years (Table 8).

Subsistence Fishery

Subsistence fishing for salmon occurs in all waters of the area. Except in districts where intensive commercial fisheries occur, the subsistence fishery is subject to very few restrictions in order to give preference to subsistence users. Salmon may be taken by gill net, beach seine or fish wheel; in the Holitna River drainage, spears are also legal gear. The aggregate length of set or drift gill nets in use by an individual may not exceed 50 fathoms. Gill nets with six inch or smaller mesh may not be more than 45 meshes in depth. Gill nets with greater

than six inch mesh may not be more than 35 meshes in depth. There are no permits required for subsistence fishing in the Kuskokwim Area.

In all commercial fishing districts, most commercial fishermen take salmon for both commercial and subsistence purposes. Short subsistence fishing closures before, during and after each commercial fishing period in the commercial fishing districts discourage illegal commercial fishing under the guise of subsistence fishing. In the Middle Kuskokwim (District 2), Quinhagak (District 4), and Goodnews Bay (District 5) the spawning tributaries are also closed before, during and after commercial periods to discourage illegal commercial fishing. In the Lower Kuskokwim (District 1) only the commercial fishing district and Kuskokuak Slough close while the spawning tributaries remain open.

Substantially more subsistence fishing time occurs compared with commercial fishing time in all districts. For example, during the 1987 fishing season (June to August) in the Lower Kuskokwim River District, subsistence fishing occurred for 66 days out of the 90 days when harvestable numbers of salmon were present. Commercial fishing was only allowed for 114 hours (4.75 days).

Calendars on which to record daily salmon catches are sent to known subsistence fishing households when the river ice breaks-up each spring. These calendars are postpaid for return when completed. Collecting calendars and subsistence catch information is also done during household interviews following the chinook salmon run, while the coho salmon run is still in progress. As a result, the catch of coho salmon is not completely documented. In 1987, no funds for documenting the subsistence harvest were available. Since it is a major portion of the total catch, an effort was made to collect as much data as possible using existing staff and funds. This required a departure from the total census that normally included most villages from Eek to Stony River. Tables 8-11 present the estimates of subsistence catch derived from the data collected.

The Commercial Fisheries Division interviewed all available fishing families in villages in the Kuskokwim drainage available in the first two weeks of August (Table 8). The Subsistence Division surveyed fishing families in Kwethluk. As a result many people who fished in the Kuskokwim Area were missed. The 1987 catch figure is a minimum value. The estimated total subsistence salmon catch was 192,444 fish composed of 71,804 chinook salmon; 18,085 coho salmon; and 102,555 small salmon (Appendix 3).

In the Kuskokwim River drainage, interviewers reached 425 households. The expanded catch of these households was based on previous years catches (See Appendix A-1). This resulted in an estimated catch of 54,779 chinook and 98,871 small salmon[2] (Table 10) for the villages from Eek to Stony River (Figure 1). In addition a large number of chinook salmon were taken home for subsistence during the two commercial fishing in District 1 when chinook salmon could not be sold. We became aware that many people had not reported the unsold chinook salmon as part of their subsistence catch since they were not taken in the subsistence fishery. We sent a questionnaire to all fishermen who made a commercial delivery during the fishing periods on 24 and 30 June. Returned questionnaires were 25 percent of the total. Based on the results an estimated 12,546 chinook salmon were taken in the commercial fishery and not reported as part of the subsistence catch (Table 9). The estimated Kuskokwim River chinook salmon subsistence catch for 1987 was 67,325 (Table 10).

It was not possible to estimate the catch of sockeye, pink and chum salmon. Since in previous years, the smaller salmon were not accurately identified in the catch. We are now recording

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[2] Small salmon include numbers of small chinook, sockeye and pink salmon, but are predominantly chum salmon.

the species separately, however, the past data base is not adequate to estimate the individual species catch.

In Quinhagak, interviewers reached 48 of an estimated 75 known fishing families. These 75 families took an estimated 3,663 chinook; 1,067, sockeye; 125, coho; 1,084, chum salmon for subsistence use (Table 11). The estimated subsistence catch in Goodnews Bay was 640 chinook, 834 sockeye, 371 chum and (Table 11).

OUTLOOK FOR 1988

Chinook Salmon

The most of the returning chinook salmon in 1988 will be five and six years of age. The Kuskokwim Area is still developing a data base for future return forecast and only broad range harvest projections are possible by examining the brood year's escapement.

The brood year escapement for the most of the 1988 chinook salmon return was at objective levels in 1982 and below objective levels in 1983 (Figure 6) in the Kuskokwim River stocks. The unusually strong showing of 4-year old chinook in 1987 and the improved run strength in 1987 makes a projection difficult. The trend of declining chinook salmon escapement

that occurred from 1982-1986 may result in smaller returns. The improved survival evidenced by the 1987 run may provide an average chinook salmon run in 1988.

Chinook salmon escapements in the Kanektok River were at or above objective levels in the brood years for 1988 (Appendix C-2) and should produce an average to above average return. In the Goodnews River the chinook salmon escapement achieved the escapement objectives in 1982 and 1983 (Appendix D-1). The chinook salmon run should be average to above average in 1988.

Sockeye Salmon

Goodnews Bay (District 5) is the only fishery within the Kuskokwim area which targets on sockeye salmon. Most sockeye salmon return at five years of age with a few maturing at four years. The escapement past the counting tower in 1983 was below the objective while the 1984 escapement was at the objective level (Appendix D-3). The sockeye salmon run should be below average to average in 1988.

Chum Salmon

Chum salmon return primarily as four and five year old fish. The 1988 return will be from the 1983 and 1984 brood year

escapements. The escapements in those two years were below or at objective levels in all systems (Appendices A-4, C-2, D-1). Therefore, a below average to average chum salmon return is expected in all districts in 1988.

Coho Salmon

Little information is available to assess coho salmon abundance in 1988. Escapement at the Kogrukluk River Weir in 1984 (the primary brood year) was above objective levels. The trend of strong returns continued in 1987 and the coho salmon return to the Kuskokwim River should be above average. The coho salmon escapement and catch were also above average in Quinhagak and Goodnews Bay in 1984. The return in 1988 is also expected to be above average.

Freshwater Fin Fish Fishery

Several species other than salmon, herring, and halibut used for commercial, subsistence, and recreation purposes in the Kuskokwim Area are inconnu or sheefish (Senodus leucichtys), whitefish (Coregonus sp and Prosopium sp), char (Saluelinus sp), rainbow trout (Salmo gairdneri), burbot (Lota lota), Arctic grayling (Thymallas arcticus), pike (Esox lucius), Arctic lamprey (Lampetra japonica), smelt (Osmerus sp), blackfish (Dallia pectoralis) and longnose sucker (Catostomus) (Appendix

A-9). The Division of Sport Fish documents the recreational fisheries.

Subsistence Fishery

Miscellaneous fin fish are taken by seine, set and drift gill nets, fish traps, dip nets, "jigging" through the ice and rod-and-reel. The most of the harvest is made by subsistence fishermen. Subsistence catches taken during the winter are usually stored frozen. Human consumption is the primary use but dog food is a significant use. No regulation limits the number of these miscellaneous species taken for subsistence. There is no funding to monitor this harvest.

Commercial Fishery

The commercial fishery has been sporadic, primarily harvesting whitefish and burbot for local markets. The most of the whitefish harvest occurs incidentally to the salmon fishery.

The regulations require, besides the permit requirements of the Commercial Fisheries Entry Commission, a permit from the Department to conduct commercial fisheries on whitefish, sheefish, char, trout, pike, smelt, burbot, and lamprey. Those species may also be taken incidentally with commercial salmon

fishing. There were 11 freshwater permit issued in 1987 for the Kuskokwim Area. The guidelines for permits are:

1. All waters of the area are open, except for the Johnson River drainage, to commercial freshwater fin fishing. The heavy subsistence utilization of those species in the Johnson River drainage is the reason for its closure to commercial fishing.

2. Whitefish, ciscos, smelt, pike, burbot, and lamprey may be taken. Sheefish, char, and trout may not be taken due to their small population, low reproductive rates, and the heavy utilization in the subsistence fishery.

3. Harvest limits are set at:

Whitefish	5,000
Ciscos	10,000
Pike	200
Burbot	500
Smelt	Unlimited
Lamprey	Unlimited

4. All legal commercial gear types are allowed; the only restriction is that gill nets must be greater than 2 1/2 inches and less than 5 inches stretch mesh. This mesh size limitation accomplishes several purposes:

a. minimizing the incidental catch of grayling, trout, char and other forbidden species;
b. the catch of whitefish, burbot, pike and cisco is predominantly of older age fish that have spawned at least once;
c. it prevents illegal commercial salmon fishing under the guise of commercial whitefish fishing.

Appendix A-12 presents the freshwater fin fish fishery catches and value since 1977.

Status of the Stocks

The Department does not monitor the status of the freshwater species in the Kuskokwim Area. Limited Department observations, advisory committee recommendations and fishermen interviews give no indication of declining populations in most drainage.

PART II. HERRING FISHERY

INTRODUCTION

There are four commercial gill net sac roe districts and a subsistence herring fishery in the Kuskokwim Area. The Security Cove District includes all the waters between the latitude of Cape Newenham and the latitude of the Salmon River (Figure 7).

The Goodnews Bay District includes the waters of Goodnews Bay inside the north and south spits at the mouth and a line between the Ufigag River and the Tunulik River. The Nelson Island District consists of all waters north of Chinigyak Cape and south of the southeast tip of Kigigak Island and east of 165°30' W. long. (Figure 8). The Nunivak Island District includes all waters extending three miles seaward of mean low water along the northern and east sides of Nunivak Islands from Cape Algonquin to Twin Mountain (Figure 9).

The subsistence fishery is conducted primarily by residents of the coastal villages of Kwigillingok, Kongiganak, Kipnuk, Chefornak, Toksook Bay, Umkumiut, Tanunak, and Newtok. The herring stocks utilized by the subsistence fishery are the same ones targeted upon by the commercial fishery in the nearby commercial fishing districts except for Chefornak, Kipnuk, Kongiganak, and Kwigillingok. These four villages primarily utilize a local stock (Central Kuskokwim) of herring that spawn primarily in the Pingurbek Islands vicinity. The Department is still attempting to assess the biomass of this stock of herring.

The Security Cove and Goodnews Bay commercial herring fisheries are managed under the statewide management policy which sets the maximum exploitation rate at 20% of the estimated spawning biomass. The upper end of the harvest range (0-20%) is applied to stocks in good condition (large volume, increasing abundance,

good recruitment). Smaller stocks or stocks that are exhibiting a trend of decreasing abundance or poor recruitment are exploited at lower than maximum rates. To provide additional protection for the subsistence herring harvest in the Nelson and Nunivak Island Districts, the following guidelines have been established by the Alaska Board of Fisheries:

1. The commercial fishery will be allowed to take up to 10% of the herring biomass, compared to up to 20% for most other fisheries having stocks of similar size and condition.

2. The commercial fishing season will be opened when a biomass of 2,500 st or spawning activity is documented.

3. Periodic closures of the commercial fishery will be scheduled, during which time subsistence fishing will the only activity allowed.

4. Several important subsistence use areas occur throughout the district, including the waters north of Cape Vancouver, and specific areas may be closed to commercial fishing to insure the adequacy of subsistence harvests.

5. The Department will use all available means, including input from local residents to insure the adequacy of

subsistence herring harvests during the commercial fishing season.

SEASON SUMMARY

The total Kuskokwim Area herring harvest for 1987 was approximately 1,971 tons of Pacific herring with a total estimated value to the fishermen of approximately $1,267,000 (Table 12). The only food/bait fishery in this area occurs during the sac-roe fishery when the roe content is below the processors' acceptable minimums. Food/bait sales are a very small portion of the harvest. The food/bait sales totaled 290 st, while the sac roe harvest was 1,681 tons.

Gill net fishing effort increased from 1986 levels in the Goodnews Bay (Figure 7) (11%), Nelson Island (9%), Nunivak Island (28%), and decreased in the Security Cove (Figure 7) District (6%) [Table 13].

Average percent roe recovery from harvested Pacific herring ranged from 7.3 in Goodnews Bay District to 9.7 in Security Cove District (Table 12). Percent harvest of estimated Pacific herring biomass ranged from 9.2 in Nunivak Island District to 16.0 in Goodnews Bay District (Table 12).

Subsistence fishermen representing at least 184 families from

11 Yukon-Kuskokwim River delta villages harvested an estimated 155 tons of Pacific herring (Table 14).

The 1987 total estimated Pacific herring spawning biomass of 16,800 tons for the surveyed portion of the Kuskokwim Area herring districts was 16% lower than the 1986 estimate (Table 12). Ages 8, 9 and older Pacific herring comprised 68% of the total run. Natural mortality of older aged fish (9+) increases with each year of life. Younger age fish (ages 3, 4, and 5) accounted for only 8% of the total biomass.

A regulatory action which affected Kuskokwim Area herring fisheries during 1987 season was the readoption of superexclusive use area regulations by the Board of Fisheries. The superexclusive status for Goodnews Bay, Nelson Island, and Nunivak Island ended by regulation on 1 January 1987; however, the board during its April meeting instituted superexclusive registration for vessels and permit holders. The early timing of western Alaska herring fisheries in 1987 required an emergency regulation to activate these regulations before opening the fishery.

During the 1987 season, Pacific herring fishermen from many western Alaska communities requested information about the possibility of establishing limited entry in A-Y-K herring fisheries. In response to this interest, Commercial Fisheries

Entry Commission (CFEC) staff and commissioners visited many fisheries during the commercial season. CFEC received petitions proposing limited entry from local herring fishermen for the Nelson Island and Nunivak Island Districts. Public hearings were later held by CFEC during September in communities throughout western Alaska and other affected areas to obtain public comment about the proposal to establish limited entry in these districts. A decision was subsequently made by the state as a first step towards limited entry status for these fisheries to limit participation during the 1988 season in the Nelson Island District to permit holders who had fished in these fisheries before 1 January 1987. During this period, CFEC will seek public input for establishing the final number of permits allowed in each fishery and the criterion used for determining which eligible permit holders will obtain a limited entry permit.

The CFEC carried out a similar moratorium for the Nunivak Island District. In the 1988 season only permit holders who had fished in the Nunivak District before 1 January 1988 will be eligible for an interim-use permit.

Stock Status

Assessment Methods

Aerial surveys were flown throughout the Pacific herring spawning season in all Kuskokwim Area commercial fishing districts to determine relative abundance, distribution, and biomass of Pacific herring. Occurrence and extent of milt, numbers of fishing vessels, and visibility features affecting survey quality were also recorded. Data collection methods were similar to those used since 1978. A total of 29 hours was spent conducting Kuskokwim Area aerial surveys: 17 hours in Security Cove (Figure 7) and Goodnews Bay, 2 hours in the central Kuskokwim Bay area, 4 hours in Nelson Island and 6 hours in Nunivak Island. Weather and sea conditions were generally fair in the central Kuskokwim area and Nelson Island. Fair to unfavorable weather and turbid water hampered survey coverage much of the season in all other Kuskokwim Area districts. Nelson Island District was the only district where a complete aerial survey biomass estimate occurred. Partial district aerial survey biomass estimates, pre-season biomass projections, and age class composition information provided the biomass estimates in the other districts.

Standard conversions of 1.52 st/538 ft^2 (water depths of 16 ft (ft) or less), 2.58 st/538 ft^2 (water depths between 16 and 26

ft) and 2.83 st/538 ft^2 (water depths greater than 26 ft) were used to convert estimated Pacific herring school surface areas to biomass within all districts.

Test fishing with variable mesh gill nets and sampling of commercial landings occurred in Goodnews Bay and Nelson Island districts to determine age, size, and sexual maturity of Pacific herring and to note occurrence of other schooling fishes. Additionally, volunteer gill net vessels collected Pacific herring samples within all districts. This information allows interpretation and modification of aerial survey biomass data.

Ground surveys conducted in some districts provide information on the distribution and density of eel grass beds and Pacific herring spawn deposition.

Spawning Populations

Security Cove. A total of 20 aerial surveys was flown on 13 days during the 1987 season, from 26 April to 16 May. Herring schools were first observed in the district on 30 April (201 tons). The largest biomass estimate (2,285 tons) came on 8 May under marginal survey conditions. No surveys were flown between 8-16 May due to strong onshore winds creating turbid waters and low cloud ceiling conditions. A survey on 16 May reported 1,927 tons; most of the fish were near Chagvan Bay.

Test fishing was done for the most part by commercial fishermen who volunteered to sample. The procedure was to have volunteers call in and ask the Department where they should test fish. Permission was given to make short 5-10 minute sets with part of a shackle, and return the samples to the Department.

The Department also conducted some test fishing with a variable mesh sinking gill net, but only sampled for male-female ratios, and gonad maturity of females. Because of budget limitations, the Department did not test fish with variable mesh gill nets to determine the age and size composition of the population in the Security Cove District during the 1987 season. Age composition data collected in the Goodnews Bay test fishing program provided the 1988 outlook for Security Cove. Age composition for Goodnews Bay and Security Cove have been similar during past years.

A sample of 336 Pacific herring came from the commercial catch during 1-14 May. Ages 5, 6, and 7 Pacific herring comprised 25% and ages 8 and older Pacific herring represented 75% of the gill net catch (Figure 10). No age-4 herring were found in the commercial catch sample. During aerial surveys a total of 3.1 linear miles of milt occurred in 6 spawn sightings. The peak of spawning was 6 May.

Goodnews Bay District. A total of 20 aerial surveys was flown on 13 days during the 1987 season, from 26 April - 16 May. The largest biomass estimate (394 tons) occurred on 3 May under poor survey conditions. All surveys were made under poor to unsatisfactory conditions because of turbid waters.

Test fishing occurred from 29 April - 22 May. A sample of 1,024 Pacific herring came from these catches. A sample of 360 Pacific herring came from the commercial catch on 3 - 7 May. Volunteer commercial fishermen collected roe quality samples from designated areas of the Bay; industry roe technicians evaluated roe quality. Because the Togiak fishery was earlier than it has been during past years, industry vessels arrived in Goodnews Bay several days before the first opening, thus providing an opportunity for industry participation in pre-fishery beach parties.

A Pacific herring biomass estimate was not feasible during the season. The pre-season biomass projection of 2,000 tons provided the basis for management of the fishery. Approximately 72.6 percent of the total biomass was age-8 and 9+ Pacific herring (Figure 10). Age-4 Pacific herring accounted for 2.2% of the biomass. During aerial surveys a total of 1.5 linear miles of milt was observed. The peak of observed spawning was 6 May.

Central Kuskokwim Bay Area. The Department flew to Quinhagak on 16 June to test fish with variable mesh gill nets for herring at the request of local residents. Fishing for a total of 4.5 hours in four sets took 10 herring, about 300 smelt, 4 chinook, 3 sockeye and 2 chum salmon and about 40 flounders. It appeared that the herring abundance was too low to harvest adequate numbers for sampling.

A total of 2 hours was flown during three aerial surveys of the Kipnuk area on 2-3 June with fair to good survey conditions. The peak spawn and largest biomass (1,225 tons) occurred on 3 June.

In addition, a sample of 294 herring from the Kipnuk area, provided by Kipnuk residents, consisted of 60% females. The sample was 15% sexually immature, 80% sexually mature and 5% spent fish. The age composition was 5.3% age-6, 6.9% age-7, 28.9% age-8, and 59% age-9+ fish.

Nelson Island District. A total of 15 aerial surveys was flown on 14 days from 12 May-4 June during the 1987 season. Surveys were made under good to poor conditions. Turbid water conditions persisted for much of the season.

Test fishing occurred from 16 May - 3 June. A sample of 793 Pacific herring came from these catches. A sample of 600 Pacific herring came from the harvest on 23 and 24 May.

Volunteer commercial fishermen under the supervision of the Department of Fish and Game conducted additional sampling of the Nelson Island herring stock before the first commercial opening. The test fishing conducted by commercial fishermen was a new program for the Nelson Island District this year. The Department encouraged commercial fishermen to participate. This portion of the test fish program began on May 16 and continued through May 23. Analysis of the samples for roe quality occurred onboard processing vessels by company technicians. ADF&G included this information in the scheduled fleet radio broadcasts. Additional samples were brought in daily to the beach at Toksook Village where roe analysis occurred, allowing the fishermen to follow the progression of roe maturity. These test fishing results showed a daily progression of roe maturity and fishery development before the first commercial opening.

A peak season aerial survey biomass estimate of 8,100 tons was made on 19 May. Ages 8 and older Pacific herring comprised 81.7% of the total biomass. Age-4 Pacific herring accounted for 1.2% of the biomass (Figure 10). During aerial surveys a total of 3.8 linear miles of milt occurred in four spawn sightings. The peak of spawning was 4 June.

Nunivak Island District. A total of nine aerial surveys was flown on 9 days during the 1987 season. Most surveys were made under fair to poor conditions.

No Department test fishing occurred within the Nunivak Island District. Age composition data collected for the Nelson Island District provided the basis for a biomass outlook for Nunivak Island for 1988. Age composition for these districts has been similar during past years. A sample of 600 Pacific herring came from the commercial catches on 13-26 May.

Volunteer members of the Nunivak Island fishing fleet conducted test fishing from 15 May through 20 May with estimated roe recovery ranging from 1.7% to 15.0%. Peak roe recovery for 3 inch mesh gear occurred on 16 May, and for 2.75 inch gear on 19 May. A total of 8 fishermen made 56 gill net sets and captured 1,154 herring in 14.95 hours of test fishing.

A peak in-season Pacific herring aerial survey biomass estimate of 1,326 tons was made on 19 May under marginal survey conditions. During aerial surveys a total of 42 linear miles of milt occurred in 58 spawn sightings. The peak of spawning was 12 May.

SUBSISTENCE FISHERY

Subsistence fishing for Pacific herring in the northeastern Bering Sea is very important in villages of the Yukon-Kuskokwim River delta. Subsistence harvest surveys have occurred annually in Yukon delta villages and sporadically in Kuskokwim delta villages since 1975. Average annual Pacific herring subsistence harvests have been at least 110 tons since 1975 (Table 14). During 1987, the Pacific herring subsistence survey resulted in an estimated 155 tons of subsistence herring harvested by at least 184 fishing families. Residents of Nelson Island villages accounted for about 80% of the reported harvest while other Kuskokwim River delta and Etolin Strait communities accounted for about 18% of the harvest. Residents of Yukon River delta villages harvested about 3 tons of Pacific herring accounting for about 2% of the estimated total harvest. Subsistence survey results reflect harvest trends, reported catches represent minimum figures since not all fishermen are contacted and surveys were not allowed by Kuskokwim River delta village councils in Kongiganak and Kwigillingok.

COMMERCIAL FISHERY

Security Cove District. The commercial Pacific herring fishery in the Security Cove District has opened and closed by emergency order since 1981 to provide for an orderly fishery and periodic

reassessments of herring biomass. Three fishing periods occurred for a total fishing time of 13 hours (Table 15). Total harvest was 313 tons. The peak catch day occurred 14 May when 59 fishermen took 312 tons.

The first opening was a 6-hour test opening on 2 May. An aerial survey on 1 May reported 670 tons of herring in the district. An estimated 15 boats fished. No herring were sold because of the small catch.

An aerial survey on 8 May reported 2,400 tons of herring in the Security Cove District, and test fishing on 9 May found schools of ripe fish. There were from 100 to 120 gill-netters on the grounds, but only 2 tons (7 deliveries) of herring were taken in the second 3-hour opening on 10 May. The average roe recovery was about 9.8%. Many fishermen found only small amounts of spawned-out fish, but a few found schools of ripe fish.

The strong northwest winds and turbid water conditions prevented aerial surveys from 8 May to 16 May, but test fishing on 13 May and 14 May showed schools of ripe fish in the district. The third opening on 14 May provided 4 hours of fishing. High onshore winds and rough seas hampered fishing during the opening. Fifty-nine boats fished with a total of 313 ton of herring sold. Roe recoveries averaged around 9.7%.

Nearly all the 1987 season harvest was sac roe quality with only a small portion (<1 ton) sold as food or bait. Average sac roe recovery for the season was 9.7%. Value of harvested Pacific herring was about $0.24 million (Table 12). Average price was $800 per ton for 10% roe recovery, with an increase or decrease of $80 per ton for each percentage point above or below 10%. Average price paid for the food or bait catch was $250 per tons.

Eight processors, three fewer than in 1986, purchased Pacific herring (Table 13). A total of 65 fishermen participated in the 1987 fishery. This was a 6% decrease in fishermen from 1986. Area residents (i.e. fishermen living in Platinum, Goodnews Bay, Quinhagak, and Bethel) did not make landings in the Security Cove herring fishery during the 1987 season.

The commercial exploitation rate of Pacific herring was 13.4% of the estimated available biomass (Table 13). Ages 8 and older Pacific herring comprised 74.9% of the total harvest. No age-4 Pacific herring were found in the commercial catch sample.

The Fish and Wildlife Protection vessel Trooper was on patrol in the Security Cove (Figure 7) District during the season. No major fishing violations occurred.

Goodnews Bay District. Since 1981, to provide for an orderly fishery and periodic reassessments of herring biomass commercial Pacific herring fishing in Goodnews Bay has opened and closed by emergency order. The commercial herring season opened with a 6-hour test opening on 3 May 1987 (Table 15). Seven tenders representing four companies were on the grounds. Quality and quantity of the commercial catch by 75 fishermen was poor. The catch of 33.5 tons of herring included 27.1 tons of bait (Table 15).

Between 4 May and 7 May, beach meetings with fishermen occurred to monitor the quality of the herring in Goodnews Bay. Samples were brought in by volunteer fishermen and analyzed by industry roe technicians. Roe quality improved between 4-7 May. A second and final 5-hour commercial opening on 7 May caught 287.3 tons of herring (Table 15). Six tenders representing 4 companies purchased fish from 95 fishermen (Table 13).

Sac roe herring accounted for 56% (179 tons) of the harvest. Wastage of Pacific herring was not a problem. Average roe recovery for the season was 7.3%. The value of the catch to the fishermen was $0.13 million (Table 12). Average price was $600 per ton for 10% roe recovery, with an increase or decrease of $60 per ton for every percentage point above or below 10%. Four processors purchased Pacific herring (Table 13). Most processors established 7% as the minimum roe recovery required

for sac roe quality Pacific herring. Pacific herring of less than 7% roe recovery sold as bait and the price averaged $50 per ton. A total of 117 fishermen participated in the 1987 fishery, an 11% increase in fishermen from 1986. Local fishermen (i.e. residents of Platinum, and Goodnews Bay) accounted for 33% of the effort and about 17% of the harvest.

The exploitation rate of Pacific herring was 16.0% of estimated available biomass (Table 12). Ages 8 and older Pacific herring comprised 95.1% of the total harvest. No age-4 Pacific herring occurred in the harvest sample.

Management of the 1987 commercial Pacific herring fishery was without major problems. The Fish and Wildlife Protection vessel Trooper patrolled the Goodnews Bay District during the season. No major fishing violations occurred.

Nelson Island District. The commercial harvest of Pacific herring began in the Nelson Island District in the 1985 season. To provide for an adequate subsistence harvest, an orderly commercial fishery, and to allow for periodic reassessments of the herring biomass the commercial fishery has opened and closed by emergency order. Two commercial fishing periods on 23 and 24 May totaled 6 hours of fishing time. The commercial fishery took 923 ton of Pacific herring. The peak catch day was 24 May when 229 fishermen took 685 ton (Table 15).

Sac roe herring accounted for 99% (915 ton) of the harvest. Average sac roe recovery was 9.2%. Wastage of Pacific herring was not a problem. The commercial herring harvest was worth $0.66 million to the fishermen (Table 12). Average price was $800 per ton for 10% roe recovery, with an increase or decrease of $80 per ton for each percentage point above or below 10%. The average price per ton paid for food or bait herring was $50. Nine processors operated in the Nelson Island District (Table 13). A total of 235 fishermen participated in the fishery. This represents a 31% increase over 1986 effort levels in the fishery. Area fishermen (residents of northern Kuskokwim Bay and Etolin Strait villages) accounted for 59% of the fishing effort and 48% of the harvest.

The commercial exploitation rate of Pacific herring was 11.4%. Ages 8 and older Pacific herring comprised 89.4% of the total harvest. No age-4 Pacific herring occurred in the catch sample.

The Traditional Councils of each village on Nelson Island, United Villages of Nelson Island, and Qaluyaat Herring Association all requested that the waters of the Nelson Island District between Atrnak Point and Talurarevuk Point, and the waters between the southern and northern edges of Chinit Point be closed by emergency order to prevent interference with the subsistence fishery. The Board of Fisheries policy statement

of management of the Nelson Island District (Figure 8) herring fishery indicated that such a closure was appropriate. These were closed waters for the entire commercial fishing season. The closure appeared to have no effect on the commercial fishery since the harvest guideline with good quality roe was easily taken.

The Fish and Wildlife Protection vessel Trooper patrolled the Nelson Island District during the season. Several citations for fishing after the closure and one citation for violating the superexclusive registration regulation were given to fishermen.

Nunivak Island District. As in the Nelson Island District, the initial commercial fishery for Pacific herring in the Nunivak Island District occurred in 1985. To provide for an orderly fishery and to allow for periodic reassessments of Pacific herring biomass the fishery has opened and closed by emergency order since 1985. Seven commercial fishing periods from 13-26 May totaled 39 hours of fishing time (Table 15). The commercial fishery took 414 tons of Pacific herring. The peak catch day was 24 May when 47 fishermen took 220 tons.

Commercial fishing opened on 13 May with a 2-hour test period. In spite of a caution to set only part of their gear and check the quality or maturity of the roe before deploying all their gear the fishermen made 39 deliveries totaling 49.9 tons for

food/bait herring with an estimated roe recovery of 4.0%. Establishing a test fishing program with volunteer commercial fishermen provided a way to monitor roe development. Aerial survey biomass estimates peaked on 18 May. By 20 May test fishing results improved and the fishery reopened on 21 May for 4 hours; however, weather conditions prohibited fishing.

On 22 May, a 4-hour opening resulted in the harvest of 1.8 tons of sac roe herring from 8 deliveries with an estimated roe recovery of 10.2%. The small volume of herring taken during this opening was primarily because of poor weather conditions, with high winds and rough seas severely restricting fishing effort. The fishery opened for 4 hours on 23 May, resulting in a harvest of 18.3 tons of herring from 19 deliveries with an estimated roe recovery of 7.3% (Table 15).

A 5-hour commercial opening began on 24 May, three hours into the period, the harvest projection was 80 tons. To reach the harvest guideline the period was extended 13 hours to allow exploitation of a second flood tide. However, inclement weather reduced fishing effort during the final 6 hours of the opening. The reported harvest at the close of the period was 162.7 tons of herring from 173 deliveries with an estimated roe recovery of 8.3% (Table 15).

The fishery reopened the evening of 25 May for 3 hours. Again, weather reduced effort to 11 deliveries and 34.7 tons of herring with 6.9% roe recovery (Table 15). On 26 May, a 3-hour opening produced 36.5 tons of herring from 33 deliveries at 6.2% roe recovery (Table 15). The remaining tenders and processors in the Nelson/Nunivak Islands District departed the grounds for Norton Sound by 27 May.

Average sac roe recovery for the season was 7.8% (Table 12). Fishermen received approximately $0.2 million for the catch. Average price was $800 per ton for 10% roe recovery, with an increase or decrease of $80 per ton for every percentage point above or below 10%. Sac roe quality herring had to be 7 percent roe recovery all other herring were bought as food or bait herring for the average price of $50 per ton. Four processors purchased herring in the Nunivak Island District. A total of 61 fishermen participated in the fishery. Resident fishermen from Mekoryuk (37) accounted for 59% of the effort and were responsible for 71% of the harvest.

Management of the 1987 commercial Pacific herring fishery was without major problems. The Fish and Wildlife Protection vessel Trooper patrolled the Nunivak Island District during the season. No major fishing violations occurred.

at a 10% exploitation rate would result in a harvest of 130 tons. A larger catch may occur if the 1988 biomass assessment is greater than the projection.

Nelson Island District

The Nelson Island commercial fishery will continue to open and close by emergency order authority. To provide additional protection for the subsistence Pacific herring harvest the following policy by the Alaska Board of Fisheries applies:

1. The commercial fishery may take up to 15% of the herring biomass, compared with up to 20% for most other fisheries having stocks of similar size and condition.

2. The commercial fishing season opens when a biomass of 2,500 tons or spawning activity occurs.

3. Periodic closures of the commercial fishery to allow undisturbed subsistence fishing will occur.

4. Several important subsistence use areas occur throughout the district, including the waters north of Cape Vancouver, and specific areas may close to commercial fishing to insure the adequacy of subsistence harvests.

5. The Department will by all available means, including input from local residents, insure the adequacy of subsistence

herring harvests during the commercial fishing season.

The spawning biomass projected to return to the Nelson Island District (Figure 8) during 1988 is 5,000 tons which at a 10% exploitation rate would result in a harvest of 500 tons.

Nunivak Island District

The Nunivak Island District commercial herring fishery will continue to open and close by emergency order. The commercial fishery will open when biomass reaches 1,500 tons or spawning occurs. Commercial harvest of Pacific herring will be up to 10% of the total spawning biomass. The biomass projected to return to the Nunivak Island District during 1987 is 2,800 tons which at a 10% exploitation rate would result in a 280 tons harvest. Changes in the boundaries of the waters opened to commercial fishing in the Nunivak Island District occurred at the Board of Fisheries December 1987 meeting.

Cape Avinof District

At the December 1987 meeting, The Board of Fisheries created a new district to harvest the Central Kuskokwim Area herring stocks. The new district boundaries are the waters adjacent to the village of Kipnuk (Figure 11). There are four villages (Chefornak, Kipnuk, Kongiganak and Kwigillingok) in the immediate area of the fishery.

In 1985 the Alaska Board of Fisheries requested the Department to increase herring aerial survey efforts in the Central

OUTLOOK AND MANAGEMENT STRATEGY FOR 1988

Based upon apparent weak recruitment of younger age classes (ages 4-7) and reduced returns of the abundant 1977 and 1978 year classes (ages 11 and 10 Pacific herring respectively), a decline in the harvestable surplus of Pacific herring available in all districts is expected in 1988. Forecast methods are under development and reliable estimates of recruitment are not available, so observed Pacific herring spawning biomass will determine harvest levels during the season. If it is not possible to determine Pacific herring abundance using aerial survey methods, assessment of stock abundance will use information from test and commercial catches along with spawn deposition observations.

Projections from post-season escapement estimates, using mean rates of natural mortality and growth for each age class, suggest that the 1988 minimal spawning biomass for the Kuskokwim Area Pacific herring stocks (Security Cove to Nelson Island) should be roughly 11,400 tons (Table 16). However, increased recruitment of ages 3 through 5-year-old Pacific herring could increase this figure. (NOTE - use all projection estimates with extreme caution as projection methods are in developmental stage and data base is not extensive.)

Of concern, is that all available data shows the occurrence of a continuing downward trend in the Pacific herring spawning biomass for all Kuskokwim Area districts due to the lack of any significant recruitment of younger age fish into the population beyond the 1978 year class. The causes responsible for this decline are not known. The resources now available to conduct research activities can not support an investigation with the scope to find the causes of the decline. Continuation of this declining biomass trend may precipitate reduced harvest levels or complete closures of selected commercial fishing districts beginning with the 1989 Pacific herring commercial fishing season. Reduced exploitation rates during 1988 will allow a harvest while protecting the declining populations.

Security Cove District

The occurrence and length of fishing periods depends on stock strength, fishing effort, and spawning activity. The declining recruitment of younger age fish into the population requires a 10 percent exploitation rate for the Security Cove Pacific herring stock in 1988. The 1988 projected return is 1,500 tons which at a 10% exploitation rate would result in a harvest of about 150 tons. A larger catch may occur if the 1988 biomass assessment is greater than the projection.

Goodnews Bay District

Management strategy for this district will be similar to that used for Security Cove. The season will open and close by emergency order. The 1988 projected return is 1,300 tons which

Kuskokwim Area. The Board of Fisheries had little information before 1985 to properly evaluate fishermen's interests in starting a new commercial herring fishery. In 1986 and then again this year, 1987, fishermen from the village of Kipnuk have submitted proposals to the Board of Fisheries to create a new Cape Avinof herring fishery.

The Department documented an estimated biomass of 2,000 tons of herring and 12 small spawns in the nine surveys flown in 1985 in the Central Kuskokwim area. Weather conditions precluded significant aerial survey biomass assessment in 1986. An estimated 1,225 tons of herring and two small spawns occurred during three surveys in 1987.

The projected 1988 biomass for the Central Kuskokwim area stock is 800 tons (Table 16). The Kipnuk area's herring stocks appear to be showing a similar decline in biomass as seen in all southwestern Alaska herring fisheries. The 10% exploitation rate will take into account the limited data base for this area and insure recognition of the subsistence fishing priority. Assuming a 10 % commercial exploitation rate, the projected harvest would be 80 tons of herring. With an additional estimated 30 tons of subsistence herring harvest, total exploitation rate in 1988 would be approximately 15 %. At the 1987 average price paid to Kuskokwim Area herring fishermen, the projected harvest would yield roughly $48,000 to the commercial fishermen in 1988.

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Table 1. Kuskokwim Area commercial and subsistence salmon catches by species and district, 1987.

DISTRICT	Chinook	Sockeye[a]	Coho[b]	Pink[a]	Chum[a]	Total
District 1, Lower Kuskokwim River:						
Commercial	33,907	134,631	385,321	41	566,499	1,120,399
Subsistence	55,914	21,228	15,278	209	49,088	141,717
SUBTOTAL	89,821	155,859	400,599	250	615,587	1,262,116
District 2, Middle Kuskokwim River:						
Commercial	2,272	1,971	14,146	2	7,837	26,228
Subsistence	11,411	8,305	2,639	82	19,959	42,396
SUBTOTAL	13,683	10,276	16,785	84	27,796	68,624
District 3, Upper Kuskokwim River:						
Commercial	CLOSED TO COMMERCIAL SALMON FISHING					
Subsistence						
SUBTOTAL						
Kuskokwim River:						
Commercial	36,179	136,602	399,467	43	574,336	1,146,627
Subsistence	67,325	29,533	17,917	291	69,047	184,113
SUBTOTAL	103,504	166,135	417,384	334	643,383	1,330,740
District 4, Quinhagak:						
Commercial	26,022	6,489	50,070	66	8,557	91,204
Subsistence	3,663	1,067	125	0	1,084	5,939
SUBTOTAL	29,685	7,556	50,195	66	9,641	97,143
District 5, Goodnews Bay:						
Commercial	3,357	27,758	29,057	54	20,381	80,607
Subsistence	816	955	43	0	578	2,392
SUBTOTAL	4,173	28,713	29,100	54	20,959	82,999
Kuskokwim Bay:						
Commercial	29,379	34,247	79,127	120	28,938	171,811
Subsistence	4,479	2,022	168	0	1,662	8,331
SUBTOTAL	33,858	36,269	79,295	120	30,600	180,142
Kuskokwim Area:						
Commercial	65,558	170,849	478,594	163	603,274	1,318,438
Subsistence	71,804	31,555	18,085	291	70,709	192,444
TOTAL	137,362	202,404	496,679	454	673,983	1,510,882

a Sockeye, pink, and chum salmon subsistence catches were estimated from the total "small salmon" catch (Table 21) based on each species proportion in the reported catch.

b Coho salmon subsistence catch is minimum. Survey was done while the fishery was in progress.

Table 2. Value of Kuskokwim area commercial salmon harvest, 1987.

	SALMON SUMMARY				
	Chinook	Sockeye	Coho	Pink	Chum
Average Price Paid (Dollar Per Pound	$1.10	$1.30	$0.73	$0.10	$0.27
Average Weight (In Pounds)	15.2	7.5	7.2	3.7	6.8
Commercial[a/] Harvest	64,719	170,407	478,628	163	599,525
Total Value	$1,079,254	$1,659,253	$2,522,657	$60	$1,100,728

SEASON SUMMARY

Total Value of the harvest:	$6,361,952
Total Permits (fishermen)[b/]:	781
Average earning per permit:	$8,146

a All Kuskokwim Area districts combined.
b Permits that made at least one delivery during that year.

Table 3. Peak aerial survey salmon escapement estimates in Kuskokwim spawning tributaries by species, 1987.[a]

	Location	Date	Chinook	Sockeye	Coho	Chum
	KUSKOKWIM RIVER:					
1	Aniak R.[b]	27-Jul	b	b		b
	Aniak Sonar[c]	31-Jul				193,464
2	Bear Ck.[b]					
3	Cheeneetnuk	26-Jul	317	0		0
4	Chineekluk	26-Jul	20	33		0
5	Chukowan R.	27-Jul	258	120		180
6	Eek R.	27-Jul	1,739	0		335
7	Mdl. Fk. Eek R.	27-Jul	387	0		0
8	Holitna R[bd]	27-Jul	b	b		b
9	Holokuk R.	26-Jul	208	0		1,590
10	Kisaralik R.	23-Jul	b	b		b
11	Kogrukluk R.[e]	27-Jul	715	415		2,055
12	Kwethluk R.					
13	Oskawalik R.	30-Jul	188	0		602
14	Salmon R.[f]	27-Jul	516	0		2,090
15	N. Fk. Salmon R.[g]	26-Jul	b	b		b
16	Md Fk. Salmon R.[g]	26-Jul	b	b		b
17	S. Fk. Salmon R.[g]	26-Jul	b	b		b
18	Tuluksak R.	28-Jul	b	b		b
	KUSKOKWIM BAY:					
19	Goodnews River	28-Jul	2,234	19,786	11,122	12,103
	Goodnews Tower[h]					
20	Kanektok River	28-Jul	1,931	51,753	20,056	6,010
	Kanektok Sonar[c]					

a Peak aerial salmon escapement index count. Aerial index counts do not represent total escapement, but do reflect annual spawner abundance trends when made using standard survey methods under acceptable conditions.
b Poor survey conditions.
c Adjusted sonar count.
d Downstream from Ignatti Weir on the Holitna River.
e Weir count.
f Aniak River system.
g Pitka Fork System.
h Expanded tower count.

4. Lower Kuskokwim River, District 1, commercial harvest ' cies and fishing effort by period, 1987.

PERIOD	HOURS	PERMITS	LANDINGS	CHINOOK		SOCKEYE		COHO		PINK		CHUM	
				NUMBERS	CPUE	NUMBERS	CPUE	NUMBERS	CPUE	NUMBERS	CPUE	NUMBERS	CPUE
1 JUNE 18	9	526	627	19,126	4.04	9,508	2.01	0	0.00	0	0.00	14,137	2.99
2 JUNE 24	9	607	762	0	0.00	24,355	4.46	0	0.00	0	0.00	54,454	9.97
3 JUNE 30	9	564	819	0	0.00	39,112	7.71	0	0.00	0	0.00	112,963	22.25
4 JULY 03	6	580	687	5,970	1.72	44,030	12.65	0	0.00	0	0.00	66,783	19.19
5 JULY 07	6	578	679	3,636	1.05	9,196	2.65	0	0.00	1	0.00	103,059	29.72
6 JULY 11	6	597	637	1,910	0.53	4,611	1.29	1	0.00	0	0.00	72,118	20.13
7 JULY 15	6	569	598	1,415	0.41	2,301	0.67	10	0.00	4	0.00	71,923	21.07
8 JULY 20	6	551	602	1,343	0.41	826	0.25	500	0.15	11	0.00	65,135	19.70
9 AUGUST 06	6	590	625	207	0.06	271	0.08	49,182	13.89	4	0.00	4,074	1.15
10 AUGUST 13	6	604	726	103	0.03	222	0.06	104,968	28.96	2	0.00	894	0.25
11 AUGUST 17	6	595	652	76	0.02	133	0.04	73,867	20.69	3	0.00	378	0.11
12 AUGUST 19	6	585	607	36	0.01	25	0.01	45,277	12.90	1	0.00	156	0.04
13 AUGUST 21	6	540	558	26	0.01	16	0.00	33,601	10.37	2	0.00	140	0.04
14 AUGUST 24	6	500	520	27	0.01	4	0.00	27,607	9.20	8	0.00	108	0.04
15 AUGUST 27	6	479	496	13	0.00	9	0.00	21,772	7.58	3	0.00	70	0.02
16 AUGUST 31	6	364	374	7	0.00	5	0.00	12,873	5.89	1	0.00	57	0.03
17 SEPT. 03	6	278	284	8	0.00	3	0.00	11,352	6.81	1	0.00	31	0.02
18 SEPT. 07	6	132	134	4	0.01	4	0.01	4,311	5.44	0	0.00	19	0.02
SEASON TOTAL		703	10,387	33,907	0.56	134,631	2.22	385,321	6.37	41	0.00	566,499	9.36
AVERAGE WEIGHT													

Table 5. Middle Kuskokwim River, District 2, commercial harvest by species and fishing effort by period, 1987. a/

PERIOD	HOURS	PERMITS	LANDINGS	CHINOOK		SOCKEYE		COHO		PINK		CHUM	
				NUMBERS	CPUE	NUMBERS	CPUE	NUMBERS	CPUE	NUMBERS	CPUE	NUMBERS	CPUE
1 JULY 03	6	15	15	1,325	14.72	511	5.68	0	0.00	0	0.00	3,200	35.56
2 JULY 07	6	22	26	935	7.08	1,459	11.05	0	0.00	0	0.00	4,152	31.45
3 AUGUST 13	6	14	14	4	0.05	1	0.01	2,273	27.06	2	0.02	304	3.62
4 AUGUST 17	6	14	15	6	0.07	0	0.00	3,374	40.17	0	0.00	102	1.21
5 AUGUST 19	6	13	13	1	0.01	0	0.00	3,928	50.36	0	0.00	39	0.50
6 AUGUST 21	6	18	18	1	0.01	0	0.00	4,571	42.32	0	0.00	40	0.37
SEASON TOTAL		29	101	2,272	3.94	1,971	3.42	14,146	24.56	2	0.00	7,837	13.61
AVERAGE WEIGHT													

a/ Preliminary harvest figures.

Table 5. Quinhagak commercial harvest by species and fishing effort by period, 1987.[a]

PERIOD	PERIOD DATE	HOURS FISHED	NO. OF FISHERMEN	CHINOOK		SOCKEYE		COHO		PINK		CHUM	
				CHINOOK	CPUE[b]	SOCKEYE	CPUE[b]	COHO	CPUE[b]	PINKS	CPUE[b]	CHUMS	CPUE[b]
1	JUNE 18-19	12	126	7,614	5.04	468	0.31	0	0.00	0	0.00	1,162	0.50
2	JUNE 22-23	12	253	10,586	3.49	746	0.25	0	0.00	0	0.00	1,051	2.45
3	JUNE 25	6	182	4,539	4.16	1,292	1.18	0	0.00	0	0.00	1,711	2.00
4	JUNE 30	6	79	690	1.46	1,360	2.87	0	0.00	0	0.00	2,066	1.83
5	JULY 03-04	12	105	2,319	1.84	2,244	1.78	0	0.00	0	0.00	1,959	2.09
6	AUGUST 3	12	67	53	0.07	73	0.09	840	1.04	0	0.00	110	1.41
7	AUGUST 6	12	69	78	0.09	153	0.18	4,206	5.08	0	0.00	285	1.46
8	AUGUST 10	12	177	62	0.03	38	0.02	8,210	3.87	0	0.00	101	1.32
9	AUGUST 13	12	116	16	0.01	16	0.01	6,612	4.75	3	0.02	19	0.34
10	AUGUST 17	12	96	15	0.01	25	0.02	5,253	4.56	2	0.01	29	0.19
11	AUGUST 19	12	70	12	0.01	3	0.00	2,819	3.36	1	0.00	9	0.00
12	AUGUST 21	12	73	13	0.01	7	0.01	3,662	4.18	1	0.00	6	0.01
13	AUGUST 24	12	90	4	0.00	2	0.00	3,240	3.00	2	0.00	6	0.03
14	AUGUST 26	12	121	6	0.00	3	0.00	4,717	3.25	7	0.00	9	0.02
15	AUGUST 28	12	82	8	0.01	7	0.01	2,753	2.80	2	0.00	4	0.01
16	AUGUST 31	12	65	1	0.00	20	0.03	2,340	3.00	6	0.00	10	0.01
17	SEPTEMBER 02	12	80	4	0.00	14	0.01	3,627	3.78	23	0.00	7	0.01
18	SEPTEMBER 04	12	48	2	0.00	18	0.03	1,791	3.11	19	0.00	13	0.00
19	SEPTEMBER 07	NO COMMERCIAL FISHING-NO BUYERS											
SEASON TOTAL		216	1,899	26,022	0.06	6,489	0.02	50,070	0.12	66	0.00	8,557	0.00

a Preliminary harvest figures.
b CPUE = Catch Per Unit Effort = HARVEST/(HOURS FISHED X NUMBER OF FISHERMEN).

Table 7. Goodnews Bay commercial harvest by species and fishing effort by period, 1987.[a]

PERIOD	PERIOD DATE	HOURS FISHED	NO. OF FISHERMEN	PERIOD CATCH AND CATCH PER UNIT EFFORT									
				CHINOOK	CPUE[b]	SOCKEYE	CPUE[b]	COHO	CPUE[b]	PINKS	CPUE[b]	CHUMS	CPUE[b]
1	JUNE 18-19	12	26	387	1.24	596	1.91	0	0.00	0	0.00	254	0.81
2	JUNE 24	12	33	476	1.20	1,892	4.78	0	0.00	0	0.00	1,188	3.00
3	JUNE 30	12	33	927	2.34	5,094	12.86	0	0.00	0	0.00	2,048	5.17
4	JULY 03	12	56	391	0.58	5,510	8.20	0	0.00	0	0.00	3,074	4.57
5	JULY 07	12	69	739	0.89	4,406	5.32	0	0.00	0	0.00	4,478	5.41
6	JULY 11	12	75	208	0.23	3,826	4.25	0	0.00	0	0.00	5,830	6.48
7	JULY 15	12	70	77	0.09	2,780	3.31	0	0.00	1	0.00	1,944	2.31
8	JULY 20	12	52	75	0.12	1,679	2.69	1	0.00	1	0.00	1,265	2.03
9	AUGUST 03	12	29	24	0.07	630	1.81	102	0.29	2	0.01	105	0.30
10	AUGUST 10	12	30	10	0.03	398	1.11	933	2.59	3	0.01	36	0.10
11	AUGUST 13	12	23	5	0.02	204	0.74	1,102	3.99	4	0.01	22	0.08
12	AUGUST 17	12	23	7	0.03	137	0.50	3,002	10.88	7	0.03	22	0.08
13	AUGUST 19	12	31	10	0.03	99	0.27	3,397	9.13	3	0.01	16	0.04
14	AUGUST 21	12	31	0	0.00	85	0.23	1,921	5.16	2	0.01	10	0.03
15	AUGUST 24	12	49	6	0.01	66	0.11	3,804	6.47	2	0.00	8	0.01
16	AUGUST 26	12	51	4	0.01	81	0.13	3,249	5.31	4	0.01	42	0.07
17	AUGUST 28	12	53	3	0.00	79	0.12	3,529	5.55	3	0.00	11	0.02
18	AUGUST 31	12	46	2	0.00	74	0.13	3,143	5.69	8	0.01	9	0.02
19	SEPTEMBER 02	12	40	5	0.01	69	0.14	3,233	6.74	7	0.01	10	0.02
20	SEPTEMBER 04	12	41	1	0.00	53	0.11	1,641	3.34	7	0.01	9	0.02
21	SEPTEMBER 07			NO COMMERCIAL FISHING-NO BUYERS									
Season Total		252	69	3,357	0.19	27,758	1.60	29,057	1.67	54	0.00	20,381	1.17

[a] Preliminary harvest figures.

[b] CPUE = Catch Per Unit Effort = HARVEST/(HOURS FISHED X NUMBER OF FISHERMAN).

.able 8. Reported and estimated total subsistence harvest in the sampled villages by species, 1987[a]

VILLAGE	FISHING FAMILY INTERVIEWED	REPORTED HARVEST CHINOOK	SOCKEYE	COHO	PINK	CHUM	ESTIMATED TOTAL FISHING FAMILY	ESTIMATED EXPANDED HARVEST[b] CHINOOK	SOCKEYE	COHO	PINK	CHUM
TUNTUTULIAK	14	1,358	365	20	2	1,984	26	2,522	991	760	5	5,385
NUNAPITCHUK	32	3,270	1,151	527	1	4,481	33	3,372	1,187	696	1	4,621
NAPAKIAK	26	2,563	1,336	548	31	2,585	28	2,760	1,439	959	33	2,784
OSCARVILLE	7	652	383	10	0	993	8	745	438	40	0	1,135
NAPASKIAK	22	2,907	2,199	400	0	6,832	22	2,907	2,199	629	0	6,832
BETHEL	137	7,454	3,152	5,380	71	6,609	149	8,107	3,810	8,077	117	7,974
KWETHLUK	48	7,393	3,238	2,136	5	6,450	57	8,779	3,845	2,537	6	7,636
AKIACHAK	35	4,371	3,079	257	0	3,908	40	4,871	3,532	286	0	4,355
AKIAK	22	3,523	1,801	1,069	26	3,670	23	3,683	1,883	1,294	28	3,837
LOWER KUSKOKWIM RIVER SUBTOTAL	343	33,491	16,704	10,347	136	37,492	386	37,746	19,324	15,278	190	44,559
TULUKSAK	35	3,419	1,596	293	0	3,192	38	3,712	1,733	337	0	3,466
ANIAK	47	1,964	1,936	2,121	36	5,300	51	2,131	2,101	2,302	39	5,751
MIDDLE KUSKOKWIM RIVER SUBTOTAL	82	5,383	3,532	2,414	36	8,492	89	5,843	3,834	2,639	39	9,217
QUINHAGAK	48	2,349	684	80	0	695	75	3663	1,067	125	0	1,084
GOODNEWS BAY	17	311	405	0	0	180	35	640	834	0	0	371
PLATINUM	7	123	85	30	0	145	10	176	121	43	0	207
KUSKOKWIM BAY SUBTOTAL	72	2,783	1,174	110	0	1,020	120	4,479	2,022	168	0	1,662
KUSKOKWIM AREA TOTAL	497	41,657	21,410	12,871	172	47,004	595	48,068	25,180	18,085	229	55,438

[a] Preliminary data.

[b] Average harvest of fishing families interviewed expanded to the estimated total fishing families.

Table 9. Estimated incidental chinook salmon catch in District 1 on 24 and 30 June, 1987.

	24 June	30 June	Total	Reported as subsistence	Not reported as subsistence
Personal[a] Interview	12,119	5,831	17,950	6,785[d]	11,165[d]
Questionnaire[b]	13,615[c]	6,555[c]	20,170	7,624[d]	12,546[d]

a Personal interviews were conducted as fishermen landed their catch at processors in Bethel. On 24 June 12% of the participants were interviewed. On 30 June, 10% of the participants were interviewed.

b Questionnaires were sent to all fishermen who made a delivery in District 1 on 24 and 30 June. These questionnaires were sent in October and 25% of the fishermen responded. The estimate is based on a "trimmed" average since 10 of the responses were greater than the standard deviations above the mean.

c Based on percent of catch reported during interviews conducted on 24 and 30 June.

d Based on percent of catch reported or unreported on questionnaires.

Table 10. Estimated total subsistence salmon harvest from Kuskokwim River, 19

Location	Chinook Salmon	Sockeye Salmon	Coho Salmon	Pink Salmon	Chum Salmon	Small[a] Salmon
			Lower Kuskokwim River			
Estimated harvest of sampled villages	37,746	19,324	15,278	190	44,559	64,073
Estimated harvest of unsampled villages[b]	5,622					6,452
Estimated harvest when Sale prohibited - not reported as subsistence	12,546					
Lower Kuskokwim River Subtotal	55,914					70,525
			Middle Kuskokwim River			
Estimated harvest of sampled villages	5,843	3,834	2,639	39	9,217	13,090
Estimated harvest of unsampled villages[b]	5,568					15,256
Middle Kuskokwim River Subtotal	11,411					28,346
			Upper Kuskokwim River [c]			
Subtotal						
Kuskokwim River Totals	67,325					98,871

a Small salmon includes sockeye, pink and chum salmon.
b Data not available.
c McGrath, Telida and Nikolai.

Table 12. Estimated biomass and commercial harvest of Pacific herring in Kuskokwim Area fishing districts, Alaska, 1981 - 1987.

District	Estimated Biomass (st)	Harvest (st)			% Harvest by Gear				Estimated Value	Exploitation Rate
		Catch	Waste	Total	Gill Net	Purse Seine	Beach Seine	Roe %	($ x1,000)	(%)
1987										
Security Cove	2,300	313	0	313	100	0	0	9.7	242	13.4
Goodnews Bay	2,000	321	0	321	100	0	0	7.3	133	16.0
Nelson Is.	8,100	923	0	923	100	0	0	9.2	661	11.4
Nunivak Is.	4,400	414	0	414	100	0	0	7.8	231	9.2
Total	16,800	1,971	0	1,971	400	0	0	34.0	1,267	50.0
1986										
Security Cove	3,700	751	0	751	100	0	0	11.2	535	20.3
Goodnews Bay	3,000	557	0	557	100	0	0	10.4	325	18.1
Nelson Is.	7,300	886	0	886	100	0	0	10.3	428	12.1
Nunivak Is.	6,000	511	0	511	100	0	0	10.1	213	8.5
Total	20,000	2,705	0	2,705	400	0	0	42.0	1,501	59.0
1985										
Security Cove	4,900	703	30	733	100	0	0	10.1	355	15.0
Goodnews Bay	4,300	724	0	724	100	0	0	8.7	309	16.8
Nelson Is.	9,500	977	0	977	100	0	0	10.6	527	10.3
Nunivak Is.	5,700	358	0	358	100	0	0	8.9	148	6.3
Total	24,400	2,762	30	2,792	400	0	0	18.8	828	30.4
1984										
Security Cove	5,100	325	10	335	100	0	0	11.8	110	6.6
Goodnews Bay	4,100	667	50	717	100	0	0	10.1	168	17.5
Total										
1983										
Security Cove	6,400	1,073	0	1,073	100	0	0	9.4	443	16.8
Goodnews Bay	3,200	435	0	435	100	0	0	9.4	185	13.6
Total	9,600	1,508	0	1,508	200	0	0	18.4	628	30.4
1982										
Security Cove	5,100	813	0	813	100	0	0	9.3	271	15.9
Goodnews Bay	2,600	486	0	486	100	0	0	9.5	188	18.7
Total	7,700	1,830	0	1,830	200	0	0	18.8	459	24.6
1981										
Security Cove	8,300	1,173	0	1,173	100	0	0	8.1	347	14.1
Goodnews Bay	4,300	657	0	657	100	0	0	7.7	196	15.3
Total	12,600	1,830	0	1,830	200	0	0	15.8	543	29.4

TABLE 11. Kuskokwim Bay subsistence salmon fishery summary, 1987[a].

VILLAGE	FAMILIES CONTACTED	ESTIMATED FAMILIES NOT CONTACTED	FISHING FAMILIES SURVEYED NUMBER	REPORTED HARVEST CHINOOK	SOCKEYE	COHO	PINK	CHUM	ESTIMATED TOTAL FISHING FAMILIES	EXPANDED HARVEST CHINOOK	SOCKEYE	COHO	PINK	CHUM
GOODNEWS	24	26	17	311	405	0	0	180	35	640	834	0	0	371
PLATINUM	10	5	7	123	85	30	0	145	10	176	121	43	0	207
GOODNEWS BAY SUB-TOTAL	34	31	24	434	490	30	0	325	45 b	816	955	43	0	578
QUINHAGAK	59	33	48	2,349	684	80	0	695	75 c	3,663	1,067	125	0	1,084
KUSKOKWIM BAY TOTAL	93	64	72	2,783	1,174	110	0	1,020	120	4,479	2,022	168	0	1,661

a Preliminary data as of 08-26-86.

b Based on the interviewer's personnel knowledge and past subsistence fishing records.

c [(FISHING FAMILIES SURVEYED/FAMILIES CONTACTED) X FAMILIES NOT CONTACTED] + FISHING FAMILIES SURVEYED.

Table 13. Number of buyers and fishermen participating in Kuskokwim Area Pacific herring fisheries, Alaska, 1981-1987.

	District	Number of Fishermen: Number of Buyers	Number of Fishermen: Gill Net
1987			
	Security Cove	8	65
	Goodnews Bay	4	117
	Nelson Island	9	235
	Nunivak Island	4	61
1986			
	Security Cove	11	88
	Goodnews Bay	5	104
	Nelson Island	4	163
	Nunivak Island	5	36
1985			
	Security Cove	6	107
	Goodnews Bay	5	83
	Nelson Island	6	143
	Nunivak Island	5	37
1984			
	Security Cove	4	38
	Goodnews Bay	4	130
1983			
	Security Cove	6	94
	Goodnews Bay	4	84
1982			
	Security Cove	3	107
	Goodnews Bay	3	84
1981			
	Security Cove	7	113
	Goodnews Bay	5	175

* Gear Prohibited.

Table 14. Pacific herring subsistence harvest (st) and effort data from selected Kuskokwim Area, Alaska, 1975 1987.

Village	Year												
	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Nelson Island													
Tunnak	22	15	57	38	34	65	40	48	94	e	43	63	48
Umkumiut	33	9	3	11	8	3	10	0	e	e	e	e	d
Tokcook Bay	34	35	21	37	51	29	14	35			46	70	51
Nightmute											3b	21	15
Newtok											7b	13	10
Total	89	59	81	86	93	97	64	83	94		99	167	124
Number of Fishing Families	109	42	80	83	54	70	93	85	43		85b	72b	96
Nunivak Island													
Makoryuk											<1	<1	
Number of Fishing Families											11	6[b]	
Other Kuskokwim Delta													
Chefornak											13[b]	c	14
Kipnuk											9	c	14
Kongiganak											3	2	c
Kwigillingok		11	1		8	13		13			5	c	c
Total		11	1		8	13		13			30	2	28
Number of Fishing Families		8	9		22	19		21			55[b]	12[b]	49
Areas Combined													
Total Catch	82	75	85	91	112	121	78	107	103	11	138	177	155
Number of Fishing Families	143	91	129	112	160	150	139	89	80	47	175[b]	131	184

a Subsistence survey results are believed to accurately reflect harvest trends, however, reported catches reflect minimum figures since all fishermen cannot be contacted.

b Fishing families were not interviewed or only a portion of fishing families were interviewed as catch was enumerated while on drying racks.

c Survey not allowed by village council.

d Umkumiut effort included with Tunnak.

e Not surveyed.

Table 15. Pacific herring commercial fishing period summary of Kuskokwim Area fishing districts, Alaska, 1987.

District	Subdistrict Section/Area	Gear	Period	Date	Time	Total hours	(st) Harvest
Security Cove	Entire	GN	1	5/2	0600-1200	6	0
			2	5/10	0600-0900	3	1.6
			3	5/14	1830-2230	4	311.8
						13	313.4
Goodnews Bay	Entire	GN	1	5/3	0800-1400	6	33.5
			2	5/7	1500-2000	5	287.3
						11	320.8
Nelson Island	Entire	GN	1	5/23	1700-2000	3	238.4
			2	5/24	1900-2200	3	684.9
						6	923.3
Nunivak Island	Entire	GN	1	5/13	2000-2200	2	49.9
			2	5/21	1300-1700	4	0
			3	5/22	1300-1700	4	1.8
			4	5/23	1400-1900	5	18.3
			5	5/24	1400-0800	18	220.5
			6	5/25	1900-2200	3	87.0
			7	5/26	2000-2300	3	36.5
						39	414.0

Table 16. Pacific herring minimal spawning biomass and harvest projections for commercial fishing districts in the Kuskokwim Area, Alaska, 1988.

District	1988 Projection [a]		
	Biomass (st)	Harvest (st) @	Exploitation Rate (%)
Security Cove	1,500	150	10
Goodnews Bay	1,300	130	10
Nelson Island	5,000	500	10
Nunivak Island	2,800	280	10
Cape Avinof	800	80	10
Total	11,400	1,140	

[a] Preseason projection. Projection may be adjusted based on inseason biomass estimates.

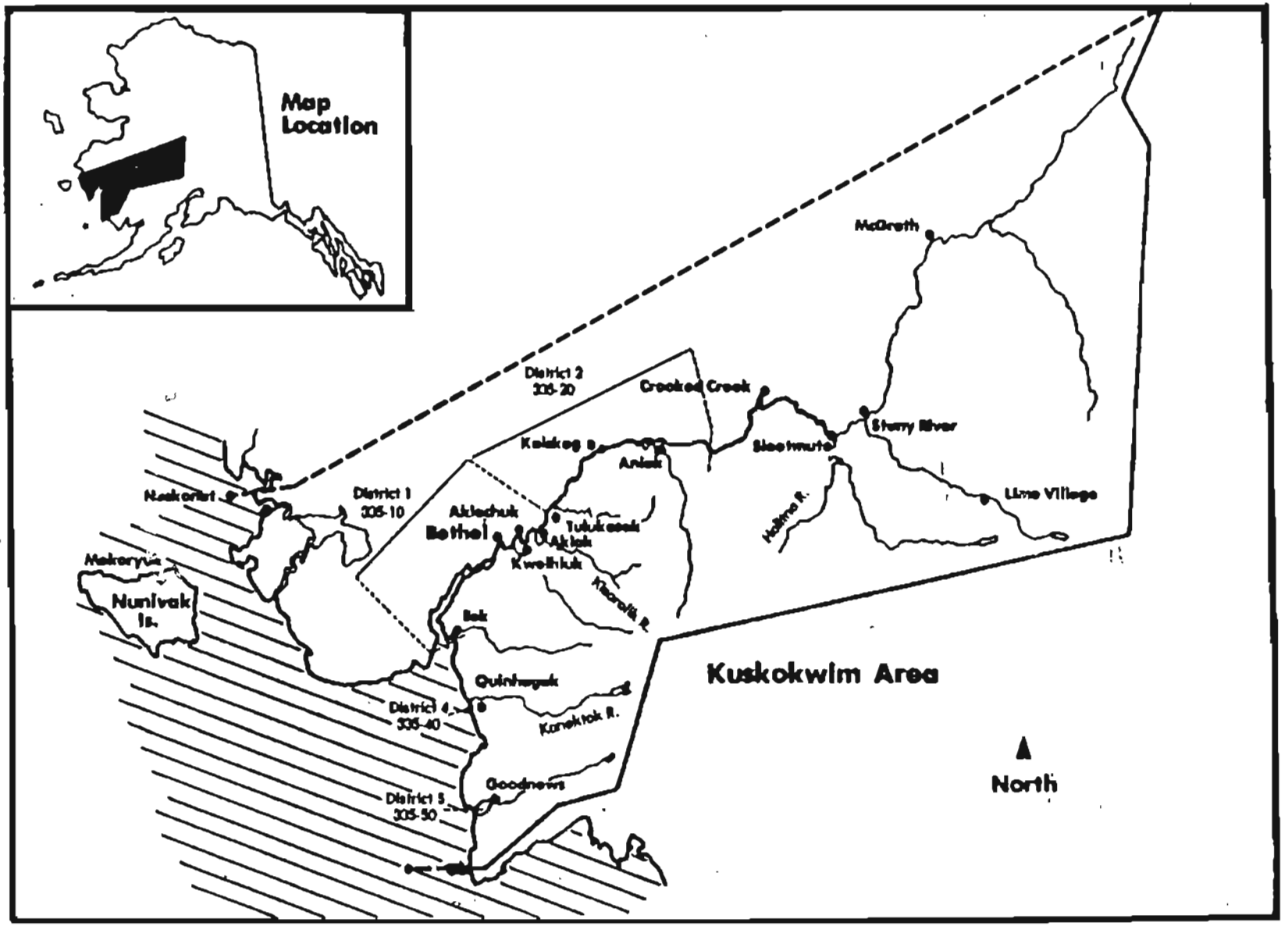


Figure 1. Kuskokwim Area Map

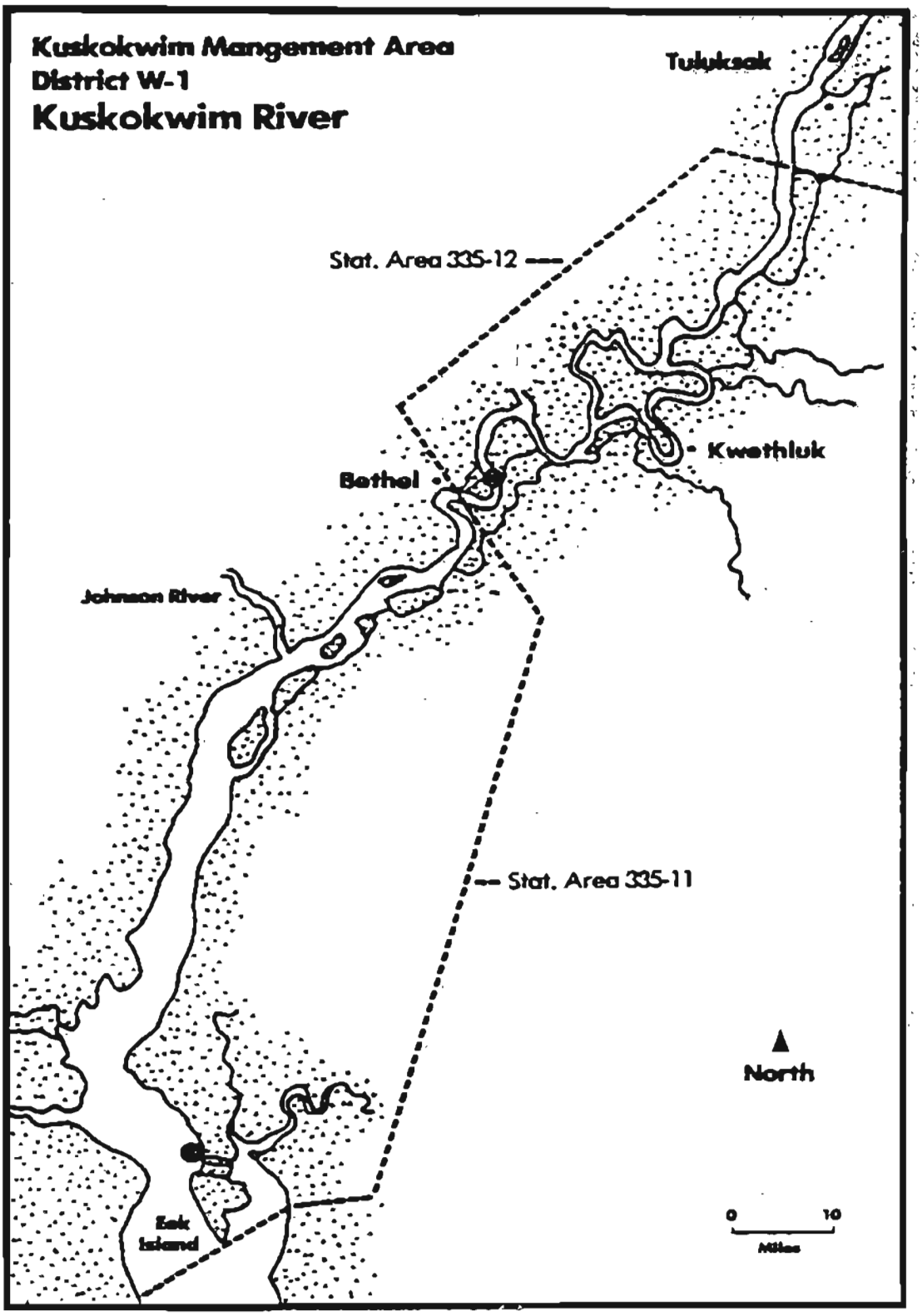


Figure 2. Kuskokwim Management Area, District W-1

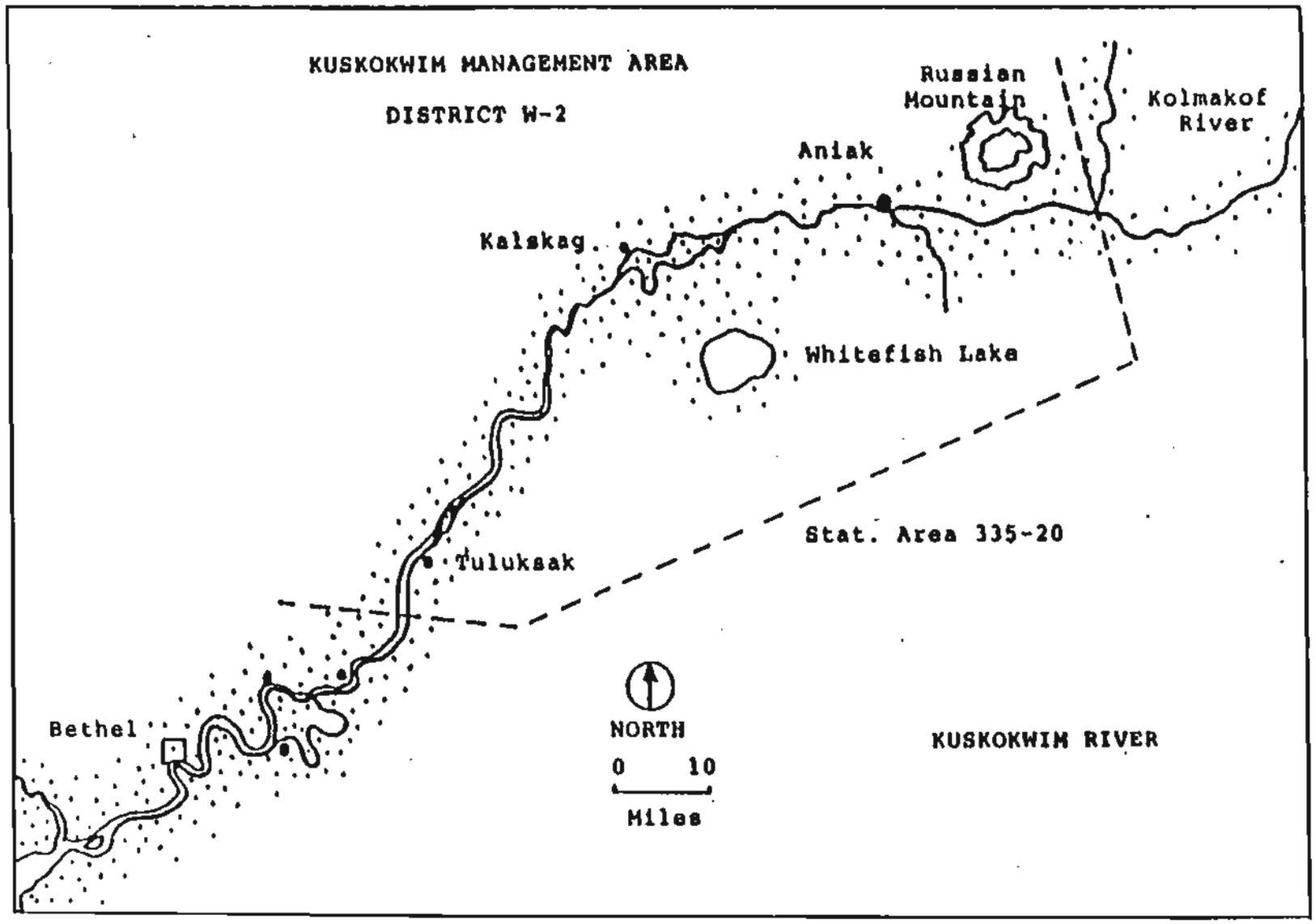


Figure 3. Kuskokwim Management Area, District W-2

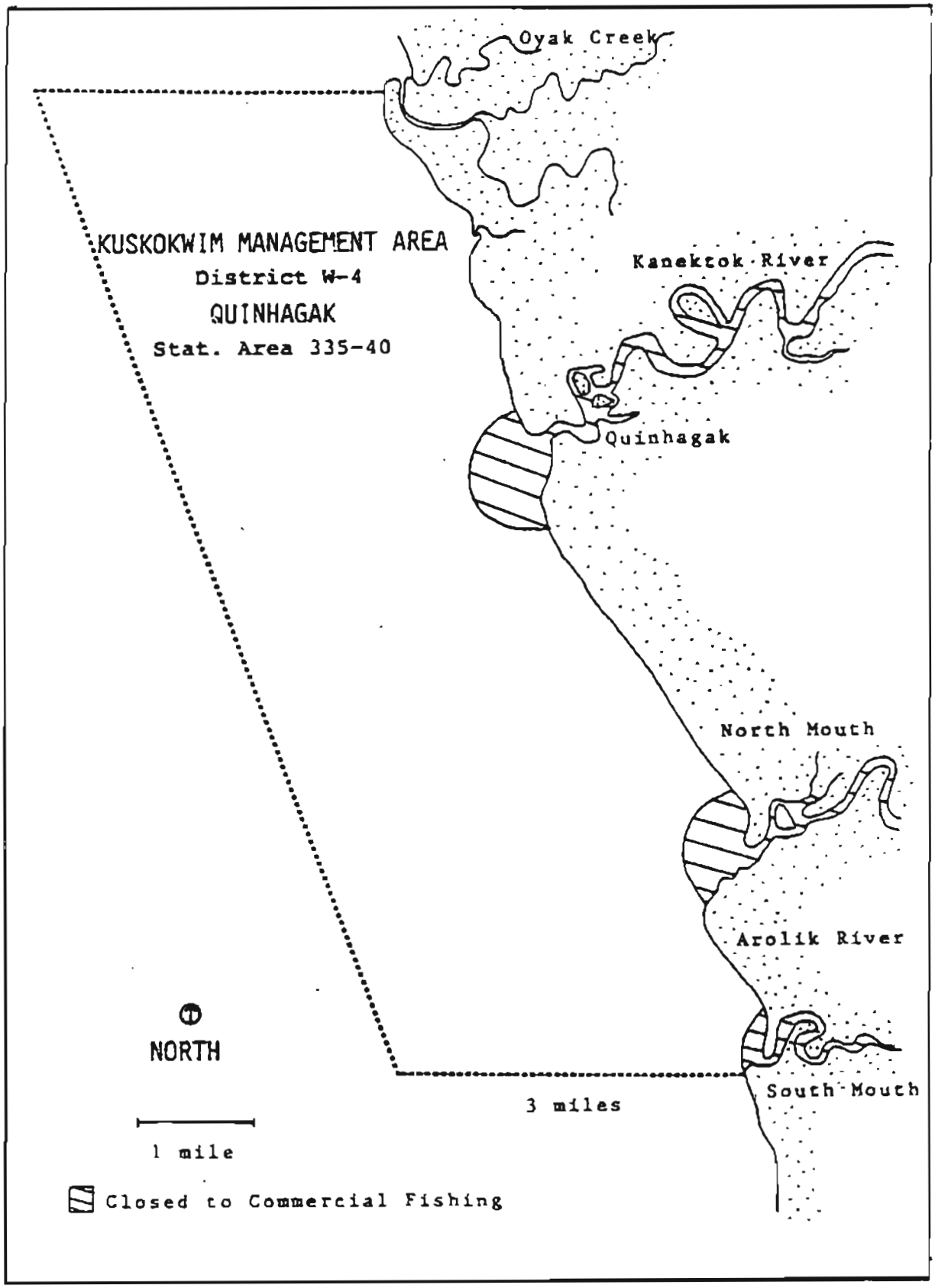


Figure 4. Kuskokwim Management Area District W-4, Quinhagak, 1987.

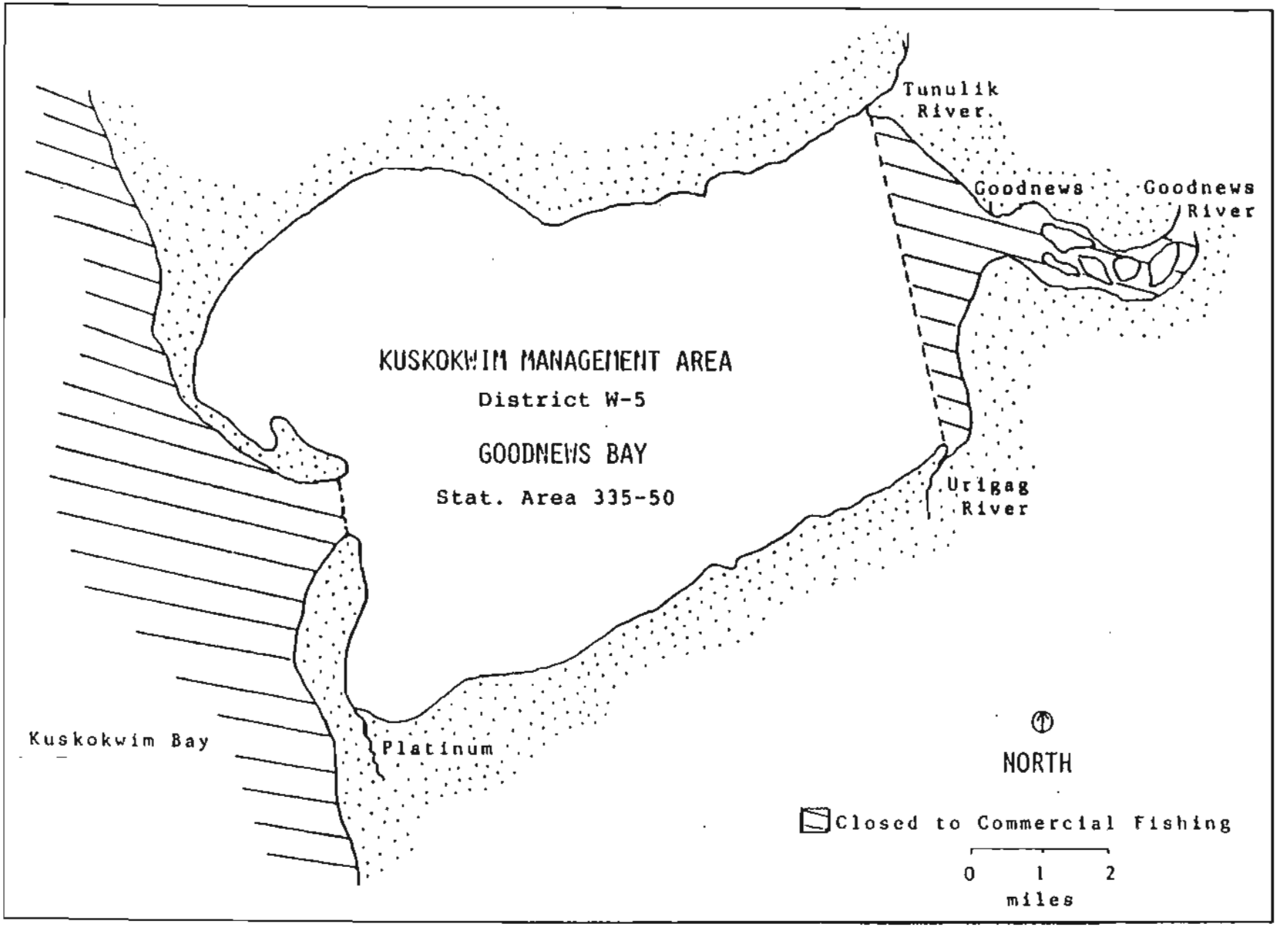


Figure 5. Kuskokwim Management Area District W-5, Goodnews Bay, 1987.

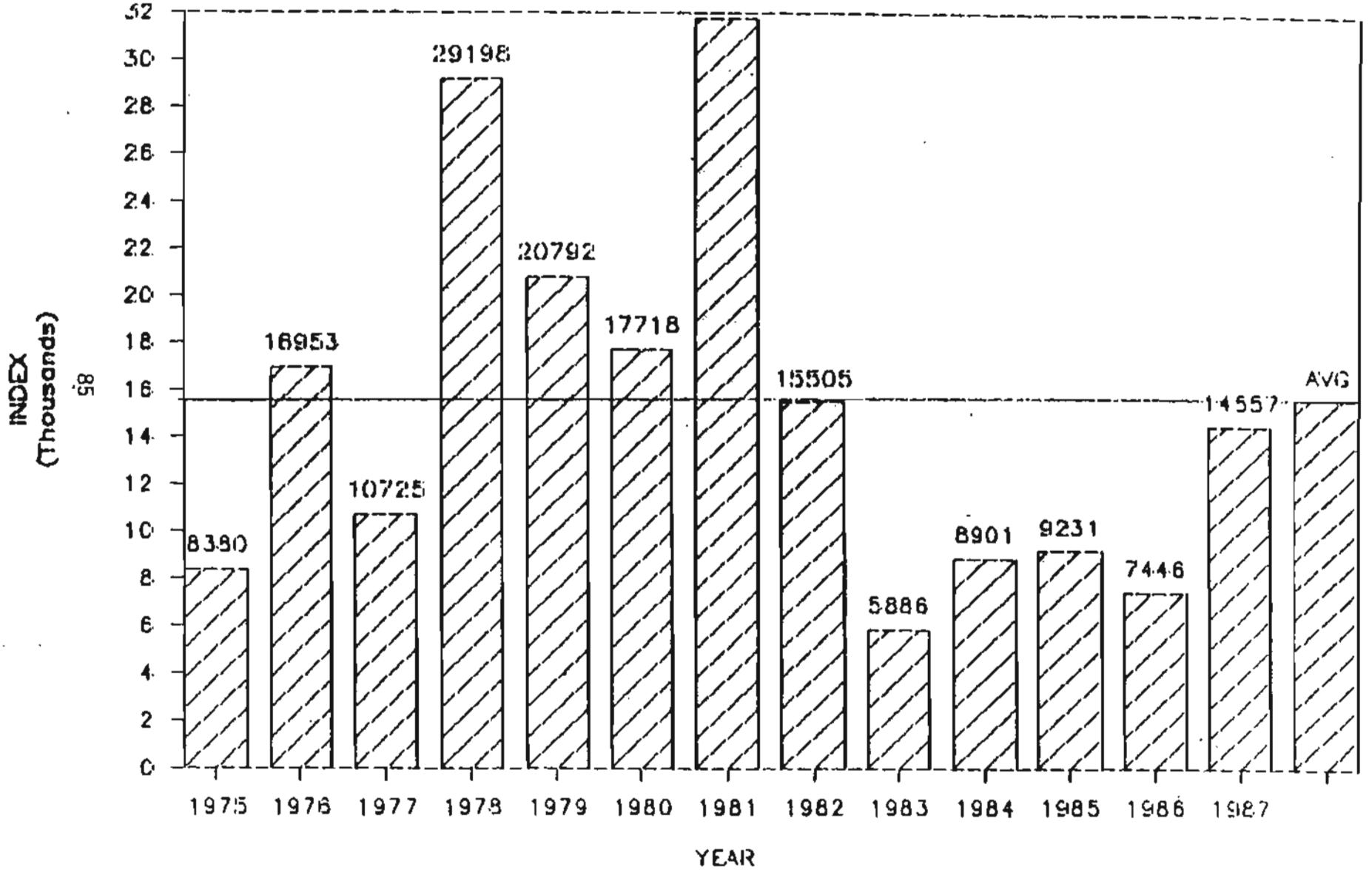


Figure 6. Kuskokwim drainage aerial c ok salmon escapement index, 1987.

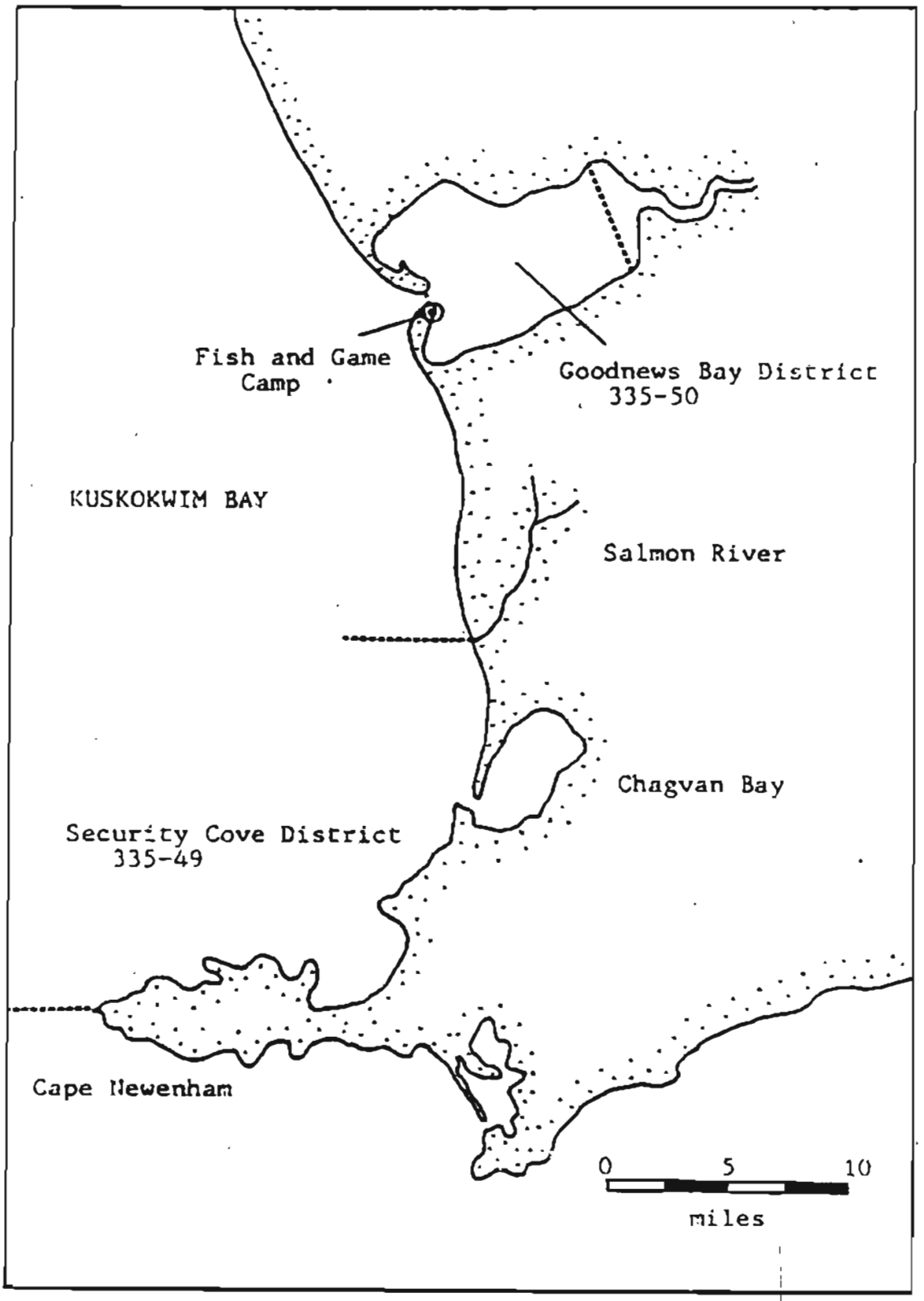
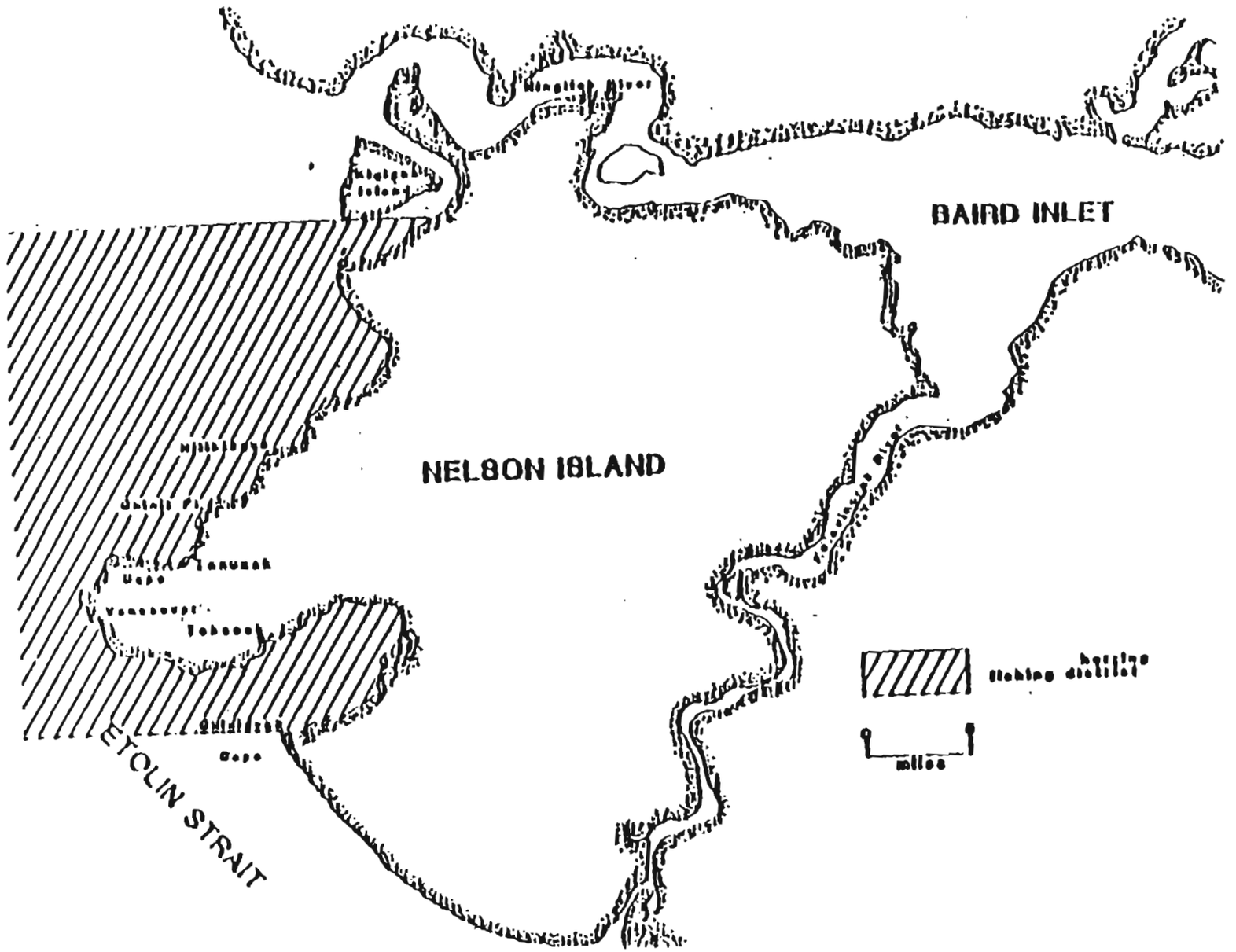


Figure 7. Goodnews Bay and Security Cove Herring District, 1987.



Fi 8. Nelson Island Herring District, 198

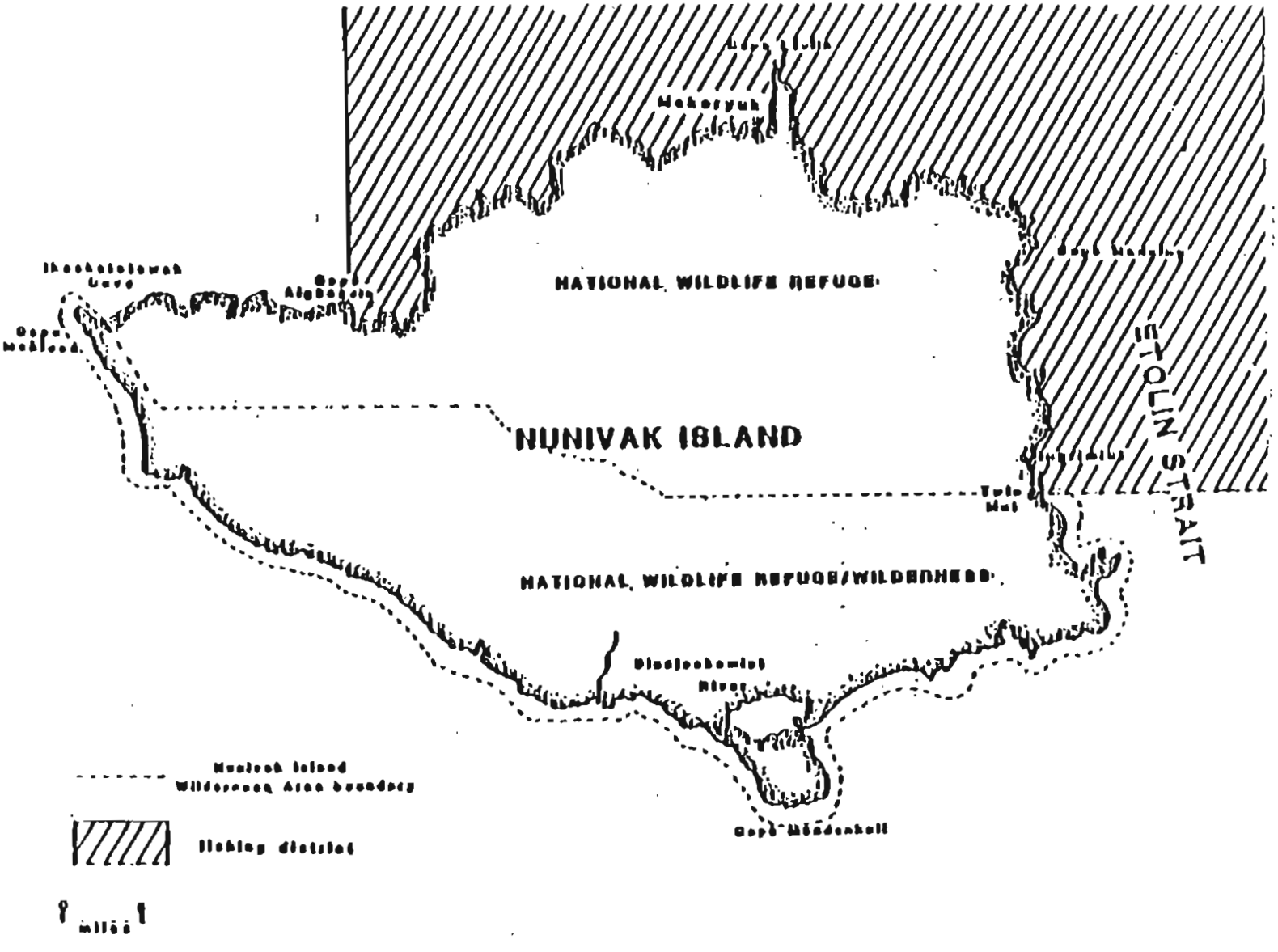


Figure 9. Nunivak Island Herring District, 1987.

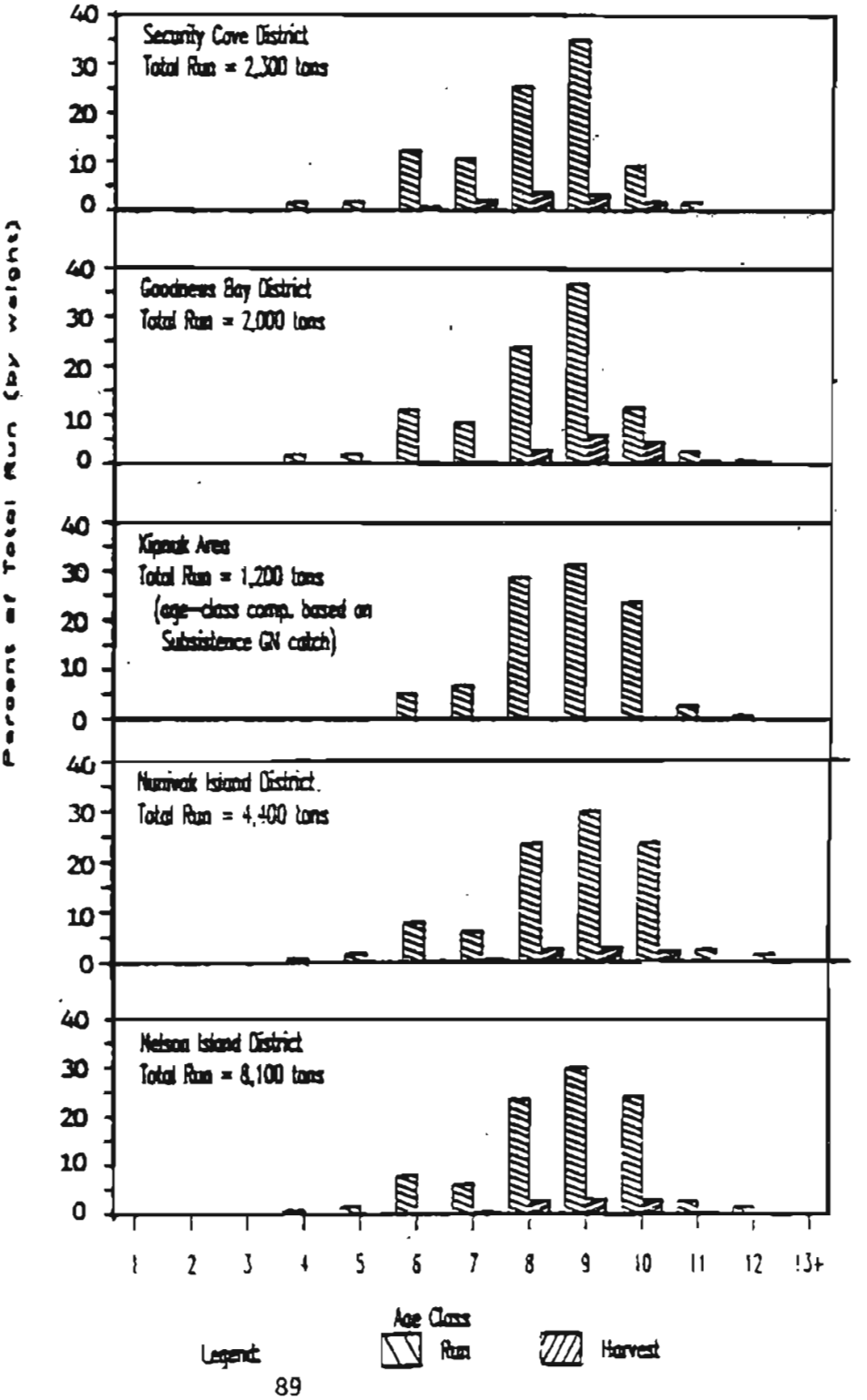


Figure 10. Herring age structure, Kuskokwi[illegible]ea, 1987.

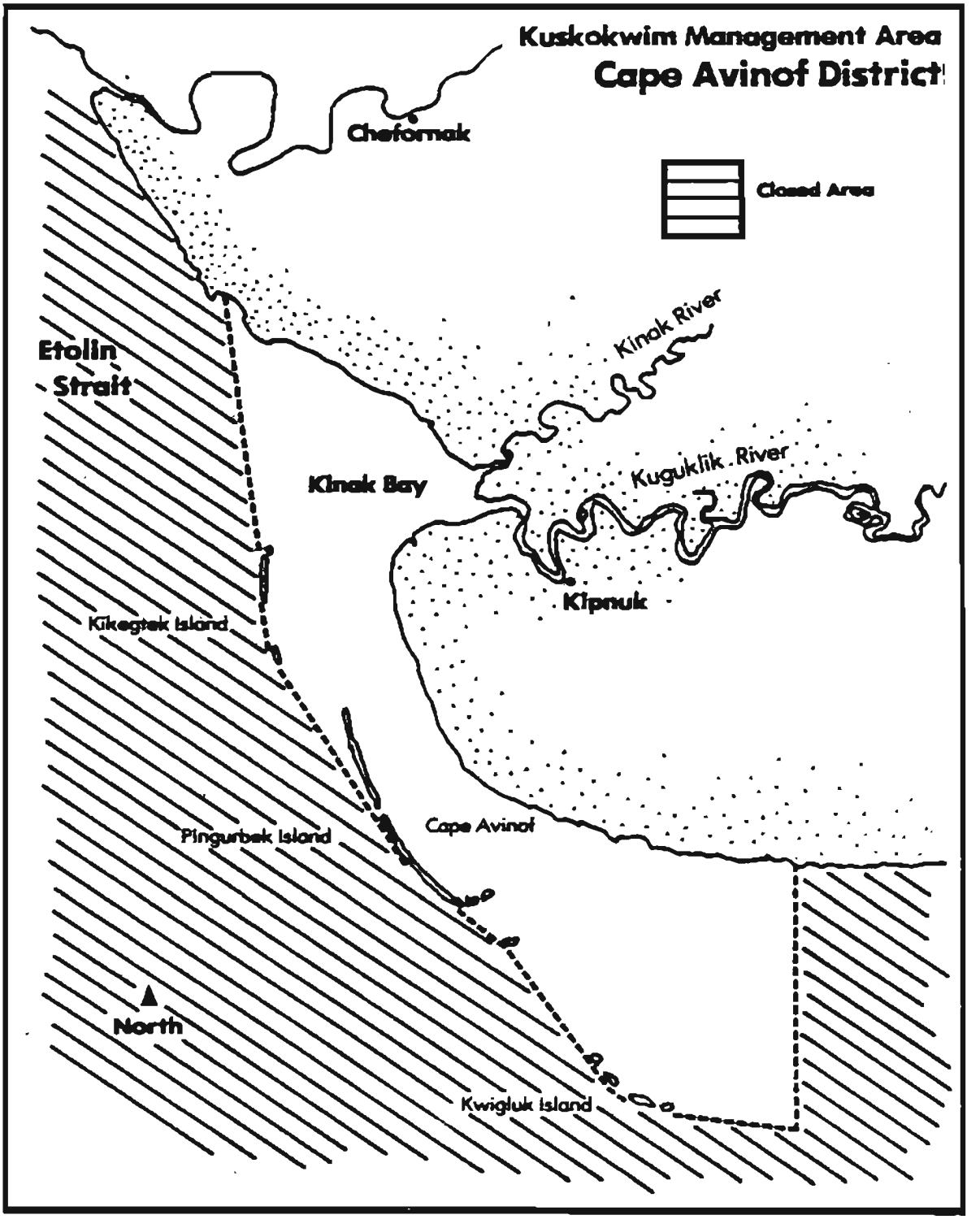


Figure 11. Kuskokwim Management Area. Cape Avinof District, 1987.

Appendix A-1. Kuskokwim Area escapement index objectives chinook, sockeye, coho and chum salmon.

	Escapement Objectives[a]			
	Chinook	Sockeye	Coho	Chum
KUSKOKWIM RIVER:				
1. Kwethluk River	1.0	-	-	7.0
a. 3-step Mt. to Canyon Cr.	0.2	-	-	-
b. Canyon Creek				
2. Kisaralik River				
a. Airstrip to Kisaralik L.	1.0	-	-	8.0
b. Kasigluk R. (upper to lower)	1.0	-	-	8.0
3. Tuluksak R. (Fog R. to Bear Cr.)	0.4	-	-	5.0
4. Aniak River				
a. Buckstock R. to Aniak L.	1.5	-	-	10.0
b. Salmon River	1.6	-	-	3.0
c. Aniak Sonar Project[b]	-	-	-	250.0
5. Holitna River				
a. Nogamut to Kashegelgok[c]	2.0	1.0	-	49.0
b. Kogrukluk Weir 3/	10.0	2.0	25.0	30.0
6. Salmon River (Pitka Fork)	1.3	-	-	-
KUSKOKWIM BAY:				
1. Kanektok River to Kagati Lake	5.8	32.0	25.0	30.5
2. Goodnews River System				
a. Main Fork and lakes	1.6	15.0	15.0	17.0
b. Middle Fork and lakes	0.0	5.0	2.0	4.0
c. Middle Fork Tower Project[d]	3.5	40.0	-	15.0

a Escapement objectives in thousands of fish are preliminary and are subject to change as additional data becomes available. Unless otherwise indicated, escapement objectives are based on aerial index counts which do not represent total escapement, but do reflect annual spawner abundance trends when made using standard survey methods under acceptable survey conditions.
b Sonar total escapement estimates.
c Total Kogrukluk River escapement estimates.
d Tower total escapement estimates.

Appendex A-2. Estimated dollar value of Kuskokwim Area commercial salmon fishery, 1964 - 1987.

YEAR	GROSS VALUE OF CATCH TO FISHERMAN	PERMITS[a] FISHED	AVERAGE INCOME
1964	83,030		
1965	90,950		
1966	87,466		
1967	138,647		
1968	290,370		
1969	297,233		
1970	362,470		
1971	371,220		
1972	360,727		
1973	827,735		
1974	1,056,042		
1975	899,178		
1976	1,380,229		
1977	3,891,950		
1978	2,337,470		
1979	3,678,000		
1980	2,725,134		
1981	3,766,525		
1982	4,213,954		
1983	2,670,400		
1984	5,809,000	774	7,505
1985	3,248,089	781	4,159
1986	4,746,089	789	6,015
1987[b]	$6,392,822	798	$8,011
FIVE YEAR AVERAGE (1983-1987)	$4,573,280		

a Permit holders who made at least one delivery. Information not avaiable prior to 1983.

b Preliminary data. Does not include confiscated or the Department's test fish project deliveries. Income figures based on fish ticket total number of fish delivered times that districts average weight for that species times that districts average price paid per pound. Income figures are estimates.

Appendix A-3. Kuskokwim Area commercial and subsistence salmon catches, 1913-1987.

Date	COMMERCIAL CATCH						SUBSISTENCE CATCH			COMBINED TOTAL
	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Other[a]	Total	
1913	7,800					7,800				7,800
1914		2,667				2,667				2,567
1915										
1916	949					949				949
1917	7,878					7,878				7,878
1918	3,055					3,055				3,055
1919	4,836					4,836				4,836
1920	34,853					34,853				34,853
1921	9,854					9,854				9,854
1922	8,944	6,120				15,064			180,000	195,064
1923	7,254					7,254				7,254
1924	19,253	900	7,167	7,167		34,487	17,700	203,148	220,848	255,335
1925	1,644	5,800				7,444	10,800	230,850	241,650	249,094
1926									738,576	738,576
1927									286,254	286,254
1928									481,090	481,090
1929									560,196	560,196
1930	7,626	2,448				10,074			538,650	548,724
1931	8,541					8,541			389,367	397,9
1932	9,339					9,339			746,415	755,75
1933							6,290	443,998	450,288	450,288
1934							20,800	597,132	617,932	617,932
1935	6,448		8,296			14,744	22,930	554,040	576,870	591,714
1936	624					624	33,500	549,423	582,823	583,547
1937	480					480			537,111	537,591
1938	624		828			1,452	10,153	400,242	410,395	411,847
1939	134					134	14,000	125,425	139,425	139,558
1940	247		500			747	8,000	415,523	423,523	424,270
1941	187		674			861	8,000	415,523	423,523	424,384
1942							6,400	325,339	331,739	331,739
1943							6,400	325,339	331,739	331,739
:::										
1946	2,288		674			2,962				2,962
1947	5,356					5,356				5,356
:::										
1951	4,210					4,210				4,210
:::										
1954	57					57				57
:::										
:::										
1959	3,760					3,760				3,760
1960	5,969	5,649	5,498		3	17,119	18,752	301,753	320,505	337,624
1961	23,246	2,308	5,090	91	18,864	49,599	27,457	179,529	206,986	256,585
1962	20,867	10,313	12,598	4,340	45,707	93,825	13,455	161,849	175,304	269,12
1963	18,571		15,660			34,231	33,180	137,649	170,829	205,06
1964	21,230	13,422	28,892	939	707	65,290	29,017	190,191	219,208	284,498

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Appendix A-3. (page 2 of 2)

Date	COMMERCIAL CATCH Chinook	Sockeye	Coho	Pink	Chum	Total	SUBSISTENCE[a] Chinook	Coho[b]	Small[c]	Total	Combined Total Harvest
1965	24,965	1,886	12,191	-	4,242	43,284	24,697		250,878	275,575	318,859
1966	25,823	1,030	22,985	268	2,610	52,716	49,022		175,735	224,757	277,473
1967	29,986	652	58,239		8,235	97,112	60,919		214,468	275,387	372,499
1968	43,157	5,887	154,302	75,818	19,694	298,858	35,380		278,008	313,388	612,246
1969	64,777	10,362	110,473	1,251	50,377	237,240	40,208		204,105	244,313	481,553
1970	65,032	12,634	62,245	27,422	60,566	227,919	69,219	11,868	246,810	327,897	555,816
1971	44,936	6,054	10,006	13	99,423	160,432	42,926	6,899	116,391	166,216	326,648
1972	55,482	4,312	23,880	1,952	97,197	182,823	40,145	1,325	120,316	161,786	344,609
1973	51,374	5,224	152,408	634	184,207	393,847	38,526	23,746	179,259	241,531	635,378
1974	30,670	29,003	179,579	60,052	196,127	495,431	26,665	32,780	277,170	336,615	832,046
1975	27,799	17,515	109,814	899	223,532	379,579	47,569		176,389	223,958	603,537
1976	49,262	13,636	112,130	39,998	231,877	446,903	37,899	4,312	223,792	286,003	732,906
1977	58,256	18,621	263,728	434	298,939	639,998	57,925	12,193	203,397	273,515	913,513
1978	63,194	13,734	247,271	81,948	282,044	688,211	38,209	12,437	125,052	175,698	843,909
1979	53,314	39,463	308,683	574	297,167	699,201	57,031		163,451	220,482	919,683
1980	48,242	42,213	327,908	30,306	561,483	1,010,152	62,139	47,335	168,987	278,461	1,288,613
1981	79,378	105,940	278,587	463	485,635	950,003	63,248	28,301	163,554	255,103	1,205,106
1982	79,816	97,716	567,451	18,259	325,471	1,088,713	60,426	45,181	195,691	301,298	1,390,011
1983	93,676	90,834	249,018	379	306,554	740,461	51,020	2,834	149,172	203,026	943,487
1984	74,006	81,307	829,965	23,902	488,482	1,497,662	60,668	15,016	144,651	220,335	1,717,997
1985	74,083	121,221	382,096	111	224,680	802,191	45,718	24,667	131,484	201,869	1,004,060
1986	44,972	142,029	734,910	16,569	349,268	1,289,748	54,256	29,742	142,930	226,928	1,516,676
1987	65,558	170,849	478,394	163	603,274	1,318,438	71,804	18,085	102,555	192,444	1,510,882
FIVE YEAR AVERAGE (1982-1986)	70,459	121,248	535,317	8,225	394,452	1,129,700	54,418	23,488	152,786	230,691	1,314,446

a Primarily chum and coho salmon.

b Reported subsistence coho salmon harvest only. Coho salmon subsistence harvest is poorly documented with no Kuskokwim River estimate attempted.

c Includes sockeye, pink and chum salmon.

Appendix A-4. Historic salmon escapement data from current Kuskokwim Area projects, 1976 - 1987.

YEAR	Operating Period	Chinook	Sockeye	Coho	Pink	Chum
KOGRUGLUK WEIR[a]						
1976	06/29 to 07/31	5,507	2,302	b	-	8,046
1977	07/14 to 07/27	2,548	2,238	b	2	21,746
1978	06/28 to 07/31	13,132	1,656	b	2	47,099
1979	07/01 to 07/24	11,063	2,589	b	1	15,277
1980	07/01 to 07/11	6,572	3,200	b	1	41,777
1981	06/27 to 10/25	16,075	17,702	11,532	6	56,495
1982	07/09 to 09/14	10,990	20,654	38,961	19	51,853
1983	06/22 to 07/02	3,009	1,147	8,327	-	8,997
1984	06/19 to 09/15	4,928	4,130	29,824	-	41,484
1985	06/29 to 09/07	4,307	4,223	16,536	-	15,002
1986	07/06 to 10/05	3,961	4,536	26,230	-	15,235
1987	08/09 to 09/23	b	b	24,238	-	b
ANIAK SONAR[c]						
1980	06/22 to 07/30	56,469	-	-	-	1,091,?
	08/16 to 09/12	-	-	81,556	-	
1981	06/16 to 08/06	42,060	-	-	-	526,320
1982	06/21 to 08/01	33,864	-	-	-	389,226
1983	06/18 to 07/28	4,911	-	-	-	114,869
1984	06/16 to 07/30	-	-	-	-	275,261
1985	06/22 to 07/28	-	-	-	-	253,048
1986	06/26 to 07/24	-	-	-	-	209,080
1987	06/22 to 07/31	-	-	-	-	193,464
MIDDLE FORK GOODNEWS RIVER TOWER[d]						
1981	06/13 to 08/15	3,688	49,108	357	1,327	21,827
1982	06/23 to 08/03	1,395	56,255	62	13,855	6,767
1983	06/11 to 07/28	6,027	25,816	d	34	15,548
1984	06/15 to 07/31	3,260	32,053	249	13,744	19,003
1985	06/27 TO 07/31	2,831	24,131	282	144	10,367
1986	06/16 TO 07/24	2,083	51,069	163	8,133	14,756
1987	06/22 to 07/30	2,274	28,871	62	62	17,519

a Pink salmon can pass through the Kogrukluk Weir.
b No count or incomplete count as project was not operated during the species' migration.
c Aniak sonar counts are adjusted to provide the total estimated escapements.
d Expanded estimates - the Goodnews River salmon counting tower's scheduled termination date precludes adequate assessment of the coho and pink salmon escapement.

Appendix A-5. Lower Kuskokwim River, District 1, and middle Kuskokwim River, District 2, commercial effort 1970 - 1987.

YEAR	UNRESTRICTED MESH SEASON	RESTRICTED MESH SEASON	COHO SALMON SEASON	TOTAL
DISTRICT 1				
1970	361	b	266	387
1971	418	216	83	422
1972	405	176	245	425
1973	456	341	411	530
1974	606	467	516	666
1975	472	540	533	737
1976	561	517	516	674
1977	563	522	572	653
1978	615	61	597	723
1979	591	617	613	685
1980	553	579	586	663
1981	589	613	586	679
1982	610	576	596	686
1983	544	619	577	679
1984	520	587	619	654
1985	a	598	627	654
1986	a	631	663	688
1987	a			703
FIVE YEAR AVERAGE (1982-1986)		602	616	672
DISTRICT 2				
1970	10	b	11	18
1971	22	b	b	22
1972	12	b	b	12
1973	28	b	b	28
1974	36	b	16	37
1975	38	b	b	38
1976	55	b	11	57
1977	83	54	24	105
1978	28	b	16	43
1979	41	b	20	43
1980	37	21	12	43
1981	153	11	16	153
1982	38	50	25	60
1983	14	42	9	43
1984	15	49	32	58
1985	a	17	16	23
1986	a	21	35	43
1987	a			29
FIVE YEAR AVERAGE (1982-1986)		36	23	45

a No unrestricted mesh season.
b No commercial salmon season.

Appendix A-6. Kuskokwim Area subsistence chinook salmon harvest by village, 1960 - 1987.

	VILLAGE[a]	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
1	KIPNUK		248	11	123	75	g				
2	KWIGILLINGOK	250	35	43	106	339	g	250	857	70	
3	KONGIGANAK	h	h	h	h						385
4	TUNTUTULIAK	226	2,226	842	2,853	1,826	1,575	3,097	3,462	2,214	2,195
5	EEK					f	f	2,821	4,572	2,586	2,038
6	KASIGLUK & EEK					1,857	3,123	3,853	7,338	4,051	4,826
7	KASIGLUK	135	1,215	127	1,302	f	f	1,032	2,786	1,485	2,888
8	NUNAPITCHUK	683	2,042	848	1,874	836	490	2,213	1,826	1,750	2,279
9	ATMAUTLUAK	h	h	h	h	h	h	h	h	h	h
10	NAPAKIAK	1,830	2,573	2,191	3,148	2,877	2,872	3,858	3,895	2,488	3,546
11	NAPASKIAK	536	1,258	759	1,569	2,201	1,071	2,710	2,998	1,663	2,227
12	OSCARVILLE	1,968	282	75	309	339	688	322	1,127	393	457
13	BETHEL	1,823	4,150	1,378	7,019	4,114	3,371	8,046	13,825	6,205	7,472
14	KWETHLUK	2,692	3,763	2,329	5,050	3,262	2,887	6,551	6,993	2,848	3,187
15	AKIACHAK	1,626	3,052	1,800	2,533	3,488	3,685	4,904	5,543	3,735	2,602
16	AKIAK	1,865	3,159	906	2,869	2,495	1,345	3,670	3,680	1,822	1,275
17	TULUKSAK	737	1,486	493	1,295	572	1,021	1,576	1,709	1,048	1,131
18	LOWER KALSKAG	961	571	f	f	710	f	f	f	1,502	2,102
19	UPPER KALSKAG	867	1,049	f	f	1,143	f	f	f	1,619	1,623
20	KALSKAGS COMBINED	1,628	1,620	805	2,681	1,853	1,395	3,379	3,567	3,121	3
21	ANIAK	1,057	888	185	602	1,104	f	2,072	1,280	517	1,
22	ANIAK[b]	1,121	742	195	632	1,178	842	2,211	1,487	551	1,586
23	CHUATHBALUK[c]	64	54	10	30	74	f	139	217	34	180
24	NAPAIMUTE	20	16	44	52	134	g	78	80	94	19
25	CROOKED CREEK	747	518	581	859	1,358	374	1,448	585	77	541
26	GEORGETOWN							12		0	8
27	RED DEVIL	f	40	f	f	f	f			111	142
28	SLEETMUTE	f	222	f	f	f	f	303	343	207	267
29	SLEETMUTE[d]	465	262	144	228	314	79			318	409
30	KASHEGELOK[e]							10			
31	STONY RIVER	435	25	31		299	79	636	303	176	2,187
32	LIME VILLAGE									0	50
33	MCGRATH							300	25		
34	TAKOTNA										
35	MEDFRA										
36	NIKOLAI										
37	TELIDA										
38	QUINHAGAK								1,349	2,756	
39	GOODNEWS BAY										
40	PLATINUM										
41	MEKORYUK										
	TOTAL	18,752	27,457	13,455	33,180	29,017	24,697	48,022	60,819	35,380	40.

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VILLAGE[a]	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
1 KIPNUK			0	0						
2 KWIGILLINGOK	220	200	10	75			75	382	75	
3 KONGIGANAK	891	41	0				122	361		
4 TUNTUTULIAK	3,558	1,841	3,214	2,858	1,577	3,492	4,807	2,470	1,656	2,268
5 EEK	2,065	1,882	1,969	1,981	2,356	2,110	3,232	2,675	1,807	2,003
6 KASIGLUK & EEK	5,996	3,527	3,261	3,845	3,767	3,823	4,845	3,999	2,415	3,145
7 KASIGLUK	3,931	1,645	1,292	1,864	1,411	1,713	1,613	1,324	608	1,142
8 NUNAPITCHUK	4,880	1,978	2,496	2,663	1,165	2,092	2,578	2,622	2,178	2,109
9 ATMAUTLUAK	1,205	548	864	1,106	382	1,042	1,158	1,015	966	2,242
10 NAPAKIAK	4,960	1,868	2,009	1,763	1,224	2,864	3,330	2,702	2,140	2,191
11 NAPASKIAK	3,446	1,916	1,578	2,048	900	2,303	3,566	1,989	2,122	2,085
12 OSCARVILLE	342	570	196	586	180	891	623	672	348	629
13 BETHEL	17,028	8,731	8,371	8,898	4,831	11,688	13,215	9,408	6,905	11,564
14 KWETHLUK	7,932	5,564	5,137	3,444	2,694	3,179	4,193	5,563	3,172	6,919
15 AKIACHAK	7,022	4,818	3,872	2,592	1,726	3,534	4,915	5,407	2,851	4,818
16 AKIAK	3,290	2,688	1,899	1,895	1,292	2,837	3,076	2,880	1,850	3,567
17 TULUKSAK	1,995	1,280	1,318	1,322	883	1,338	1,411	2,906	1,906	1,489
18 LOWER KALSKAG	2,146	2,355	2,804	1,309	1,586	2,755	4,536	1,750	1,951	2,821
19 UPPER KALSKAG	734	601	401	938	463	1,752	1,413	2,813	1,253	1,590
20 KALSKAGS COMBINED	2,880	2,956	3,005	2,247	2,049	4,507	5,949	4,563	3,204	4,411
21 ANIAK	2,136	1,078	2,105	1,030	1,952	1,391	1,490	4,991	1,331	2,634
22 ANIAK[b]	2,355	1,255	2,366	1,972	2,626	1,985	2,147	6,498	2,569	4,823
23 CHUATHBALUK[c]	219	178	281	942	674	594	657	1,507	1,238	2,189
24 NAPAIMUTE	22	17	20	13	6	16	420	176	144	148
25 CROOKED CREEK	684	291	183	269	850	238	284	818	488	728
26 GEORGETOWN	2	0	0	0				68	0	
27 RED DEVIL	232	135	182	138	205	623	195	324	153	488
28 SLEETMUTE	161	181	69	504	269	256	356	684	300	755
29 SLEETMUTE[d]	393	316	251	842	474	879	551	1,008	453	988
30 KASHEGELOK[e]								8/	156	233
31 STONY RIVER	105	402	95	287	439	761	620	33	182	171
32 LIME VILLAGE	15	2,119	0	0	8/	100	33	0		38
33 MCGRATH										581
34 TAKOTNA										65
35 MEDFRA										
36 NIKOLAI										80
37 TELIDA										
38 QUINHAGAK								2,012	2,328	1,420
39 GOODNEWS BAY								574		228
40 PLATINUM										110
41 MEKORYUK										
TOTAL	69,218	42,928	40,145	38,528	28,885	47,569	57,899	57,925	38,209	57,031

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	VILLAGE[a]	1980	1981	1982	1983 11/	1984 11/	1985	1986 11/	1987 11/	1982-198
1	KIPNUK			60						
2	KWIGILLINGOK									
3	KONGIGANAK			52			235			
4	TUNTUTULIAK	2,545	4,446	1,984	2,523	3,519	2,644	2,452	2,522	2,497
5	EEK	1,557	1,731	2,578	2,040		1,436			
6	KASIGLUK & EEK	3,261	5,108	5,693			3,490			
7	KASIGLUK	1,704	3,377	3,115			2,054			
8	NUNAPITCHUK	2,612	2,918	2,577	2,668		2,018	3,410	3,372	2,514
9	ATMAUTLUAK	1,288	1,247	1,752			1,559			
10	NAPAKIAK	2,582	3,017	3,500	2,047		1,805		2,760	
11	NAPASKIAK	3,160	2,911	2,872			2,155		2,907	
12	OSCARVILLE	477	495	523			918		745	
13	BETHEL	12,591	15,367	13,518	8,402	11,066	6,940	11,984	8,107	9,881
14	KWETHLUK	7,627	6,167	5,897		6,732	4,937	5,824	8,779	5,848
15	AKIACHAK	5,405	3,094	4,468		5,588	3,254		4,871	
16	AKIAK	3,355	2,386	2,745		3,413	2,975		3,683	
17	TULUKSAK	2,807	2,446	2,220	1,671	2,286	2,749		3,712	
18	LOWER KALSKAG	3,817	3,271	2,594		3,242	1,707	1,866		2,204
19	UPPER KALSKAG	1,889	1,171	963		657	805	587		693
20	KALSKAGS COMBINED	5,806	4,442	3,357		3,899	2,312	2,253		2,847
21	ANIAK	2,750	3,102	2,071	3,174	1,847	1,828	4,824	2,131	2
22	ANIAK[b]	4,257	3,943	3,562			2,930			
23	CHUATHBALUK[c]	1,507	841	1,491			1,102			
24	NAPAIMUTE	90	45	138			53			
25	CROOKED CREEK	634	512	515			218			
26	GEORGETOWN	93								
27	RED DEVIL	255	298	273			178			
28	SLEETMUTE	220	728	242		154	745			
29	SLEETMUTE[d]	475					921			
30	KASHEGELOK[e]	82								
31	STONY RIVER	332	233	419			167			
32	LIME VILLAGE									
33	MCGRATH			160	830	730	59			
34	TAKOTNA									
35	MEDFRA		1	1	1	1	1	1		
36	NIKOLAI		500	778	750	795	615			
37	TELIDA									
38	QUINHAGAK	1,940	2,562	2,402	2,542	3,109	2,341	2,682	3,863	2,615
39	GOODNEWS BAY	498	1,308	1,185	1,004	597	399	513	840	740
40	PLATINUM	182	100	51	62	32	27	42	176	43
41	MEKORYUK									
	TOTAL	62,138	63,248	60,426	51,020	60,668	45,720	54,258 12/	71,804	58,500

a Lower Kuskokwim River villages 1 through 16; Middle Kuskokwim River villages 17 through 23; Upper Kuskokwim River villages 24 through 37; Kuskokwim Bay villages 38 through 40.

b Aniak, Chuathbaluk and Russian Mission.

c Chuathbaluk and Russian Mission.

d Sleetmute to Red Devil.

e Kasheqelok and Holitna.

f Data collected, but reported with another village.

g Data collected, combined with unspecified village or villages.

h Village not yet founded.

i Village abandoned.

j Kuskokwim Area total estimate based on a village subsurvey.

Appendix Table A-7. Kuskokwim Area subsistence "small"[1] salmon harvest by village, 1960 - 1987.

VILLAGE[a]	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
1 KIPNUK		2,858	739	1,877	1,395	g				
2 KWIGILLINGOK	1,430	320	1,251	685	1,663	g	680	2,847	2,800	
3 KONGIGANAK	h	h	h	h	h	h	h	h	h	2,481
4 TUNTUTULIAK	4,101	8,528	9,692	6,791	8,445	15,943	10,324	15,625	15,384	17,464
5 EEK					f	f	1,340	3,071	2,989	3,437
6 KASIGLUK & EEK					3,139	7,077	3,102	5,380	8,240	6,745
7 KASIGLUK	1,400	3,657	1,705	1,020	f	f	1,762	2,309	5,251	3,308
8 NUNAPITCHUK	2,743	4,868	7,474	2,462	1,171	4,251	3,095	6,278	8,841	6,933
9 ATMAUTLUAK	h	h	h	h	h	h	h	h	h	h
10 NAPAKIAK	8,888	5,789	6,167	3,711	12,307	12,170	9,167	14,824	13,280	12,390
11 NAPASKIAK	5,199	4,286	5,548	3,584	6,275	25,969	9,090	8,325	12,526	12,237
12 OSCARVILLE	3,948	1,680	1,723	1,025	487	8,125	504	1,983	2,104	2,743
13 BETHEL	12,872	12,845	8,470	8,623	15,423	18,820	13,789	16,829	31,522	14,615
14 KWETHLUK	32,975	21,106	22,788	13,188	19,186	22,869	23,610	24,294	35,090	23,463
15 AKIACHAK	15,932	12,578	10,521	6,725	10,085	23,979	13,998	13,836	21,409	10,646
16 AKIAK	13,061	8,205	6,551	8,478	9,659	10,422	10,748	9,085	18,848	9,853
17 TULUKSAK	19,281	7,928	8,526	10,289	9,777	11,678	12,048	10,458	11,114	6,057
18 LOWER KALSKAG	11,563	7,764	f	f	9,472	f	f	f	8,483	10,621
19 UPPER KALSKAG	38,398	27,149	f	f	11,381	f	f	f	11,244	9,[illegible]
20 KALSKAGS COMBINED	49,961	34,913	16,478	23,249	20,863	31,783	18,248	24,826	19,727	20[illegible]
21 ANIAK	36,673	15,935	10,120	10,608	17,874	f	12,930	16,158	19,221	15,[illegible]
22 ANIAK[b]	59,043	18,857	13,904	13,237	22,933	18,400	18,555	23,411	29,154	22,649
23 CHUATHBALUK[c]	22,370	2,922	3,784	2,629	5,059	f	5,625	7,253	9,933	7,523
24 NAPAIMUTE	11,017	6,235	3,898	5,192	4,873	g	3,704	5,862	1,694	1,453
25 CROOKED CREEK	41,596	17,558	27,259	23,186	32,550	17,549	19,201	13,894	12,754	6,810
26 GEORGETOWN							70	0	2,030	3,664
27 RED DEVIL	f	1,350	f	f	f	f			2,400	1,130
28 SLEETMUTE	f	6,884	f	f	f	f	4,319	6,951	11,773	8,258
29 SLEETMUTE[d]	16,926	8,234	9,007	5,387	5,706	9,380			14,173	9,388
30 KASHEGELOK[e]							670			
31 STONY RIVER	1,700	2,642	1,855		4,254	12,463	3,956	9,488	12,808	12,080
32 LIME VILLAGE									1,200	2,400
33 MCGRATH							1,000	50		
34 TAKOTNA										
35 MEDFRA								750		
36 NIKOLAI								900		
37 TELIDA								0		
38 QUINHAGAK								6,023	2,209	
39 GOODNEWS BAY										
40 PLATINUM										
41 MEKORYUK										
TOTAL	301,753	178,529	161,849	137,849	190,191	250,878	175,735	214,468	278,008	204,[illegible]

-continued-

	VILLAGE[a]	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
1	KIPNUK			0							
2	KWIGILLINGOK	340	500	1,284	770			463	1,585	60	
3	KONGIGANAK	3,597	610	0	37			438	595		
4	TUNTUTULIAK	10,600	9,964	11,103	13,572	28,321	7,429	8,390	9,109	5,563	5,300
5	EEK	4,855	2,213	783	2,401	4,227	2,754	3,837	1,286	1,055	625
6	KASIGLUK & EEK	10,586	4,256	2,717	8,491	11,000	6,462	7,681	4,790	2,297	2,804
7	KASIGLUK	5,731	2,043	1,934	6,090	6,773	3,708	4,044	3,504	1,242	2,179
8	NUNAPITCHUK	11,412	3,375	5,500	7,663	12,498	5,447	6,466	8,981	4,369	5,188
9	ATMAUTLUAK	1,181	1,197	947	2,818	4,585	2,524	3,361	3,319	3,720	5,170
10	NAPAKIAK	16,371	4,427	5,191	8,461	21,494	11,630	9,265	7,945	5,163	6,281
11	NAPASKIAK	11,169	7,039	8,858	8,478	20,467	12,930	21,380	11,588	8,378	5,251
12	OSCARVILLE	4,669	1,875	498	3,081	5,617	3,237	2,376	1,910	1,213	956
13	BETHEL	33,475	9,905	15,885	33,930	34,892	26,808	28,533	14,857	12,394	21,240
14	KWETHLUK	27,702	13,941	11,721	19,565	39,747	19,183	28,443	25,405	11,311	14,173
15	AKIACHAK	29,776	12,298	9,286	9,884	15,108	14,008	15,298	18,233	8,824	8,403
16	AKIAK	13,003	9,264	5,108	6,118	18,434	13,890	12,163	13,728	8,720	11,705
17	TULUKSAK	7,628	5,115	5,145	5,946	13,261	7,819	11,673	7,575	4,386	4,874
18	LOWER KALSKAG	11,158	3,509	3,490	2,873	12,285	8,823	17,158	7,888	3,508	8,659
19	UPPER KALSKAG	5,309	3,530	1,460	5,807	9,631	8,904	8,527	11,720	6,100	5,955
20	KALSKAGS COMBINED	16,467	7,039	4,950	8,680	21,896	16,727	25,685	19,606	9,808	14,614
21	ANIAK	10,030	4,833	5,243	13,547	9,305	9,597	13,355	21,256	7,800	14,836
22	ANIAK[b]	21,001	10,565	13,752	27,718	13,592	10,158	21,179	28,232	12,325	20,449
23	CHUATHBALUK[c]	10,871	5,632	8,509	14,171	4,287	561	7,824	4,976	4,725	5,513
24	NAPAIMUTE	1,224	1,862	4,645	3,451	76	226	1,636	4,892	1,886	2,057
25	CROOKED CREEK	9,216	3,094	3,658	1,981	4,954	2,461	3,236	2,934	2,133	3,105
26	GEORGETOWN	800	0	0	10				1,095	0	
27	RED DEVIL	2,454	1,067	1,695	2,782	2,868	4,481	4,231	5,445	5,565	7,782
28	SLEETMUTE	4,484	3,203	4,293	2,188	4,212	5,787	7,571	5,111	2,771	1,200
29	SLEETMUTE[d]	6,918	4,270	5,988	4,950	6,900	10,248	11,802	10,556	8,336	8,982
30	KASHEGELOK[e]									4,580	5,239
31	STONY RIVER	8,407	2,293	3,000	3,875	4,328	3,992	5,523	3,900	3,545	3,355
32	LIME VILLAGE	1,280	3,702	0	0		1,210	2,800	0		3,580
33	MCGRATH										5,398
34	TAKOTNA										0
35	MEDFRA										
36	NIKOLAI										2,711
37	TELIDA										0
38	QUINHAGAK								4,186	6,243	1,130
39	GOODNEWS BAY								856		554
40	PLATINUM										528
41	MEKORYUK										403
TOTAL		246,810	116,391	120,318	178,258	277,170	176,369	223,792	203,397	125,052	163,451

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	VILLAGE[a]	1980	1981	1982	1983[n]	1984n	1985	1986[n]	1987	1982 - 1986 AVG.
1	KIPNUK			280						
2	KWIGILLINGOK			h						
3	KONGIGANAK			206			803			
4	TUNTUTULIAK	8,305	5,873	8,500	3,585	5,103	5,934	3,075	6,381	5,799
5	EEK	743	1,188	1,012	1,441		844			
6	KASIGLUK & EEK	5,915	4,171	7,888			5,981			
7	KASIGLUK	5,172	2,983	8,876			5,337			
8	NUNAPITCHUK	6,354	5,485	8,648	7,137		5,799	6,679	5,809	6,752
9	ATMAUTLUAK	4,405	2,683	4,787			5,774			
10	NAPAKIAK	8,102	8,667	8,618	3,120		5,017		4,256	
11	NAPASKIAK	7,391	7,290	10,139			8,991		9,031	
12	OSCARVILLE	1,363	1,260	1,665			2,286		1,573	
13	BETHEL	22,593	35,093	37,857	20,287	18,863	12,746	26,866	11,901	24,965
14	KWETHLUK	18,188	10,736	18,837		14,516	12,476	15,778	11,484	13,641
15	AKIACHAK	11,481	8,292	13,083		13,214	9,178		7,887	
16	AKIAK	10,125	10,736	9,339		8,027	8,133		5,748	
17	TULUKSAK	7,841	6,500	5,040	5,077	9,407	7,750		5,199	
18	LOWER KALSKAG	7,903	3,894	6,925		8,886	5,728	3,734		6,358
19	UPPER KALSKAG	6,020	5,746	5,362		2,566	2,087	5,268		3,941
20	KALSKAGS COMBINED	13,923	9,640	12,287		11,454	7,815			10,299
21	ANIAK	13,091	11,922	14,946	23,549	8,849	11,127	8,842	7,891	14,079
22	ANIAK[b]	15,293	20,382	21,898			16,717			
23	CHUATHBALUK[c]	2,202	8,460	8,952			5,590			
24	NAPAIMUTE	2,531	884	2,392			552			
25	CROOKED CREEK	7,185	6,843	3,622			4,158			
26	GEORGETOWN	1,042								
27	RED DEVIL	4,651	4,205	7,380			1,230			
28	SLEETMUTE	1,670	7,320	2,936		2,208	5,084			
29	SLEETMUTE[d]	8,321	11,725	10,316			8,314			
30	KASHEGELOK[e]	8,207								
31	STONY RIVER	2,827	1,586	2,196			1,307			
32	LIME VILLAGE									
33	MCGRATH			53	2,900	2,450	782			
34	TAKOTNA									
35	HUSPRA		j	j	j	j	j	j		
36	NIKOLAI		3,700	4,360	2,600	5,100	2,900			
37	TELIDA			0	0	0	0			
38	QUINHAGAK	1,992	2,737	2,186	776	890	1,008	1,347	2,151	1,519
39	GOODNEWS BAY	1,823	3,178	2,210	1,308	1,177	903	1,048	1,205	1,755
40	PLATINUM	0	333	544	210	42	151	88	328	256
41	MEKORYUK			740						
	TOTAL	168,987	183,554	195,691	149,172	144,651	131,484	142,930[k]	102,555	156,910

-continued-

a Lower Kuskokwim River villages 1 through 16; Middle Kuskokwim River villages 17 through 23; Upper Kuskokwim River villages 24 through 37; Kuskokwim Bay villages 38 through 40.

b Aniak, Chuathbaluk and Russian Mission.

c Chuathbaluk and Russian Mission,

d Sleetmute to Red Devil.

e Kasheqelok and Holitna.

f Data collected, but reported with another village.

g Data collected, combined with unspecified village or villages.

h Data not collected.

i Village not yet founded.

j Village abandoned.

k Preliminary data.

l Catches include a majority of chum salmon but include small numbers of sockeye, coho, pink and small chinook salmon.

m 1986 Kuskokwim Area total does not include a upper Kuskokwim River estimate.

n Expanded Kuskokwim Area total estimate based on a village subsurvey.

Appendix A-8. Mean salmon weights and prices paid to commercial fisherman, Kuskokwim Area, 1967 - 1987.

Year	Mean Weights - Pounds					Prices - Dollars				
	Chinook	Sockeye	Coho	Pink	Chum	Chinook	Sockeye	Coho	Pink	Chum
1967	27.8	7.4	5.9	a	7.0	0.13	0.05	0.09	a	0.04
1968	23.8	6.2	7.2	4.0	7.9	0.16	0.10	0.09	0.05	0.04
1969	19.6	6.2	7.3	3.6	5.8	0.19	0.15	0.10	0.06	0.07
1970	18.9	5.4	7.3	3.3	6.1	0.20	0.21	0.14	0.08	0.08
1971[b]	26.2	6.9	6.1	a	6.4	0.17	0.10	0.13	a	0.08
1972	a	a	a	a	a	0.20	a	0.16	a	0.08
1973	a	a	a	a	a	0.25	a	0.26	a	0.19
1974	a	a	a	a	a	0.46	0.34	0.27	0.23	0.25
1975	a	a	a	a	a	0.54	a	0.31	a	0.26
1976[c]	17.0	6.7	7.8	3.5	7.0	0.64	0.43	0.40	0.25	0.27
1977	22.7	8.3	7.8	3.9	7.3	1.15	0.45	0.65	0.25	0.45
1978	24.2	6.5	7.1	3.9	8.9	0.50	0.49	0.40	0.12	0.32
1979	16.6	6.9	7.9	3.9	7.0	0.66	0.53	0.75	0.11	0.37
1980	14.1	6.7	6.9	3.6	6.4	0.47	0.31	0.64	0.12	0.24
1981	17.8	7.2	6.4	3.5	7.5	0.84	0.61	0.63	0.11	0.23
1982	19.3	7.2	7.3	3.6	7.3	0.82	0.41	0.53	0.05	0.22
1983	18.8	6.8	6.8	3.5	7.4	0.54	0.51	0.39	0.05	0.33
1984	16.4	6.6	7.7	3.2	6.7	0.89	0.52	0.55	0.07	0.28
1985	17.0	7.0	7.5	3.6	7.1	0.71	0.59	0.51	0.05	0.25
1986	17.0	7.2	6.4	3.4	6.8	0.80	0.70	0.60	0.05	0.25
1987	15.2	7.5	7.2	3.7	6.8	1.10	1.30	0.73	0.10	0.27
Five Year Average (1982-19	17.7	7.0	7.1	3.5	7.1	0.75	0.55	0.52	0.05	0.27

a Information unavailaale.
b Information was not availaale for district 5.
c Information was not availaale for district 4.

Appendix A-9. Fishes commonly found in the Kuskokwim Area, 1987[a].

Species Code	Genus and Species	Common Name
162	Cottus cognatus	Slimy Sculpin
410	Onchornynchus tshawytscha	Chinook Salmon
420	Onchornynchus nerka	Sockeye Salmon
430	Onchornynchus kisutch	Coho Salmon
440	Onchornynchus gorbuscha	Pink Salmon
450	Onchornynchus keta	Chum Salmon
500	Esox lucius	Northern Pike
513	Osmerus mondax	Rainbow Smelt
514	Hypomesus olidus	Pond Smelt
520	Salvelinus alpinus	Arctic Char
541	Salmo gairdneri	Rainbow Trout
550	Salvelinus namaycush	Lake Trout
570	Stenodus leucichtnys	Inconnu
581	Coregonus nasus	Broad Whitefish
582	Coregonus pidschian	Humpback Whitefish
583	Coregonus sardinella	Least Cisco
584	Coregonus autumnalis	Arctic Cisco
585	Prosopium cylindraceum	Round Whitefish
590	Lota lota	Burbot
601	Lamperta japonica	Arctic Lamprey
610	Thymallus arcticus	Arctic Grayling
630	Dallia pectoralis	Alaska Blaskfish
640	Catostomus catostomus	Longnose Sucker
661	Pungitius pungitius	Ninespine Stickleback
113	Eleginus gracilis	Saffron Cod
121	Platichthys stellatus	Starry Flounder
122	Liopsetta glacialis	Arctic Flounder
166	Oligocottus maculosus	Tidepool Sculpin
200	Hippoglossus stenolepis	Pacific Halibut
230	Clupea haranguspassasi	Pacific Herring
516	Mallotus villosus	Capelin

a Based on American Fisheries Society Special Publication No. 12, A List of Common and Scientific Names of Fishes from the United States and Canada (Fourth Edition). Committee and Names of Fishes, Bethesda, Maryland, 1980.

Appendix Table 6. Japanese mothership commercial catch of king salmon of western Alaska origin, 1964-83.

Year	Number of Fish in Thousands		
	Total Mothership Catch	Catch of Western Alaska Origin	
		Number	Percent
1964	410	253	62
65	185	106	57
66	208	112	54
67	128	70	55
68	362	226	62
1969	554	435	79
70	437	345	79
71	206	144	70
72	261	170	65
73	119	47	39
1974	361	287	80
75	162	109	67
76	283	168	59
77	93	65	70
78	105	31	30
1979	126	65	52
80	704	380	54
81	88	26	30
82	107	43	40
83 1/	87	24	28
20 Year Total	4,986	3,106	
1964-73 Total	2,870	1,908	
1974-83 Total	2,116	1,198	
20 Year Average	249	155	62
1964-73 Average	287	191	67
1974-83 Average	212	120	57

1/ Preliminary.

(Literature Cited: 1 and 20)

Swift River	612	380	486	302
Tatlawisksuk River	617	383	491	305
Devil's Elbow	645	401	519	323
Vinasale	736	460	610	341
McGrath Village	881	507	685	428
Middle Fork	885	553	759	474
Big River	896	560	770	481
Pitka Fork	916	572	790	494
Medra Village	923	577	797	499
South Fork	927	579	801	501
East Fork	938	586	812	508
North Fork	938	586	812	508
Nikolai Village	994	621	868	542
Swift Fork	1,129	706	1,003	627
Telida Village	1,178	736	1,052	658
Highpower Creek	1,193	746	1,068	667
Fish Creek	1,277	798	1,151	719
North Fork Lake	1,327	829	1,201	751
Top of Kuskokwim Drainage	1,490	931	1,364	852

a These distances were taken from the USGS 1:36,300 series of topographic maps. The "mouth" was defined as the point where the "grassland" banks are 24 miles apart.

Appendix A-11. Swimming Speed.

Source: AYK Regional Kuskokwim Stock Separation Report No. 1

Tagged at Tuluksak, 1961	AVG/DAY	RANGE
Chinook Salmon	11.5	6.0 - 16.0
Sockeye Salmon	7.7	4.9 - 16.0
Coho Salmon	9.7	3.6 - 13.2
Chum Salmon	12.2	3.4 - 48.0
Pink Salmon	13.2	3.0 - 26.0

Source: AYK Regional Kuskokwim Stock Separation Report No. 2

Tagged at Tuluksak, 1962	
Chinook Salmon	7.07
Sockeye Salmon	11.16
Coho Salmon	N/A
Chum Salmon	13.66
Pink Salmon	14.22

Note comparison of peak catch indicated chinook salmon travel time of 20 miles per day.

Source: AYK Regional Kuskokwim Stock Separation Report No. 3

Tagged at Enarayak, 7 mi upstream Eek Island		
Chinook Salmon	7.7	3.3 - 19.6
Sockeye Salmon	7.0	5.1 - 10.6
Chum Salmon	6.2	5.1 - 36.0

Peak subsistence catches at seven locations Napakiak to Crooked Creek indicated.

Chinook Salmon	16.7
Sockeye Salmon	23.0
Chum Salmon	13.6

Appendix A-12. Commercial freshwater fin fishery catch data, Kuskokwim Area, 1977-1987.

Year	Number of[a] Fishermen	Number Caught Whitefish	Number Caught Burbot	Total Weight Whitefish	Total Weight Burbot	Total Value Whitefish	Total Value Burbot	Total Value Total
1977	3	718	0	c	0	$952.00	$0.00	$952.00
1978	b	1,735	0	6,017	0	c	$0.00	c
1979	b	3,219	0	11,211	0	c	$0.00	c
1980	4	603	0	2,173	0	$830.00	$0.00	$830.00
1981	4	1,197	0	4,620	0	$2,310.00	$0.00	$2,310.00
1982	5	1,512	0	6,219	0	$2,856.00	$0.00	$2,856.00
1983	0	0	0	0	0	$0.00	$0.00	$0.00
1984	2	0	651	0	c	$0.00	c	c
1985	5	555	1,829	2,275	2,016	$1,137.50	$455.90	$1,593.40
1986	3	0	0	0	3,428	$0.00	$857.00	$857.00
1987[d]	3	276	0	986	0	$789.00	$0.00	$789.00

a Does not include fisherman who delivered catches incidental to the commercial salmon fishery.
b Does not include catches incidental to the commercial salmon fishery.
c Data not available.
d Preliminary data.

Appendix B-1. Associated environmental and catch data, Bethel, Kuskokwim River, 1965-1986.[a]

YEAR	RIVER BREAKUP	RIVER CLEAR OF ICE	FIRST REPORTED		RIVER FREEZE-UP
			Chinook Salmon	Smelt	
1965	[b]	[b]	May 31	May 25	[b]
1966	June 01	[b]	June 1 [c]	June 06	Oct. 20
1967	May 06	May 17	May 20	May 25	Oct. 19
1968	May 14	May 17	May 26	[b]	[b]
1969	May 06	May 13	May 23	[b]	[b]
1970	May 12	May 16	May 21	May 27	Oct. 18
1971	May 24	May 29	June 06	June 07	Nov. 04
1972	May 23	May 28	June 05	June 06	Nov. 03
1973	May 14	May 18	May 27	May 31	Oct. 15
1974	May 07	May 19	May 23	May 25	[b]
1975	May 19	May 25	May 26	May 29	Oct. 29
1976	May 18	May 18	June 01	[b]	Oct. 27
1977	May 23	June 01	May 31	June 02	Oct. 18
1978	[b]	[b]	May 18	May 22	Oct. 25
1979	Apr 27	May 07	May 16	[b]	Nov. 19
1980	May 04	May 10	May 17	May 22	[b]
1981	May 09	May 12	May 22	May 06	[b]
1982	May 18	May 22	June 01	June 03	Oct. 30
1983	May 11	May 13	May 23	June 01	Oct. 22
1984	May 13	May 23	May 27	May 27	Oct. 18
1985	May 25	May 29	June 03	June 04	Oct. 22
1986	May 11	May 18	May 28	May 28	Oct. 24
1987	May 17	May 20	May 25 [d]	May 31	Nov. 06

[a] Environmental data, breakup, clear of ice and freeze-up from National Weather Service.
[b] Data not available.
[c] Caught at Kalskag
[d] Also first chum.

Appendix B-2. Comparative chinook salmon catches by fishing period by year in District 1, Lower Kuskokwim River, 1974 - 1987.[a]

YEAR	DATE	CATCH	FISHERMEN	FISHERMEN HOURS	CATCH PER HOUR (CPUE)
1974	June 10-11	4,384	422	5,064	0.90
	June 13-14	5,790	488	5,957	1.00
	June 17-18	5,857	506	6,072	1.00
Subtotal [b]		16,031	606	16,992	0.90
	June 27	558	267	1,602	0.40
	July 01-02	561	380	4,560	0.08
	July 04-05	196	282	3,384	0.06
	July 08-09	286	376	4,512	0.06
	July 18	31	190	1,140	0.03
Total		17,663	666	32,190	0.50
1975	June 16	359	12	72	5.00
	June 19-20	1,031	46	552	1.90
	June 23-24	17,235	483	5,796	2.90
Subtotal [b]		18,625	541	6,420	2.90
	June 30	691	279	1,674	0.40
	July 03	636	360	2,160	0.30
	July 07	421	369	2,214	0.20
	July 10	195	304	1,824	0.10
	July 14	179	326	1,956	0.10
Total		20,747	539	16,248	1.20
1976	June 17	6,962	459	2,754	2.50
	June 21	13,048	495	2,970	4.40
Subtotal [b]		20,010	954	5,724	3.40
	June 28	4,143	348	2,088	2.00
	July 01	1,550	415	2,490	0.60
	July 08	894	381	2,286	0.40
	July 12	377	344	2,262	0.20
	July 15	236	265	1,590	0.10
Total		27,177	674	16,440	1.70

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Appendix B-2. (Page 2 of 5)

YEAR	DATE	CATCH	FISHERMEN	FISHERMEN HOURS	CATCH PER HOUR (CPUE)
1977	June 15	12,458	467	2,802	4.50
	June 20	16,227	484	2,904	5.60
Subtotal [b]		28,685	563	5,706	5.00
	June 27	1,337	378	2,268	0.60
	June 30	504	409	2,454	0.20
	July 04	266	331	1,986	0.10
	July 07	407	368	2,208	0.20
	July 14	153	385	2,310	0.06
Total		31,352	653	16,932	1.80
1978	June 09	7,590	509	3,054	2.5
	June 14	6,142	266	1,596	3.8
	June 16	12,341	396	2,376	5.2
	June 22	1,724	72	288	6.00
	June 23	8,342	429	1,716	4.90
Subtotal [b]		36,139	615	9,030	4.00
	June 26	1,964	499	2,694	0.70
	June 29	1,759	422	2,652	0.70
	July 03	894	476	2,856	0.30
	July 06	1,460	485	5,820	0.30
	July 10	694	428	5,136	0.10
	July 10	293	422	2,532	0.10
Total		43,203	617	30,720	1.40
1979	June 11	12,270	523	3,138	3.90
	June 15	12,363	549	3,294	3.80
Subtotal [b]		24,633	591	6,432	3.80
	June 22	5,651	502	3,012	1.90
	June 26	2,277	531	3,186	0.70
	June 29	1,583	542	3,252	0.30

- Continued -

Appendix B-2. (Page 3 of 5)

YEAR	DATE	CATCH	FISHERMEN	FISHERMEN HOURS	CATCH PER HOUR (CPUE)
1979	July 03	1,233	542	3,252	0.40
	July 10	470	520	3,120	0.20
Total		35,847	617	22,254	1.60
1980	June 12	9,891	469	2,814	3.50
	June 18	16,921	468	2,808	6.00
Subtotal [b]		26,812	553	5,622	4.80
	June 23	4,777	426	2,616	1.80
	June 26	1,460	408	2,448	0.60
	July 02	498	383	2,298	0.20
	July 09	445	431	2,586	0.20
otal		33,992	597	15,570	2.20
1981	June 10	11,897	489	2,934	4.10
	June 16	17,985	541	3,246	5.50
Subtotal [a]		29,882	589	6,180	4.80
	June 22	3,830	511	3,066	1.25
	June 25	2,000	508	3,048	0.66
	June 30	2,563	484	2,904	0.88
	July 02	1,707	459	2,754	0.62
	July 06	1,088	461	2,766	0.39
	July 09	491	440	2,640	0.37
Total		42,011	613	23,358	1.80
1982	June 14	4,912	464	2,784	1.80
	June 17	11,285	496	2,892	3.80
	June 21	13,343	499	2,994	4.50
	June 24	8,548	459	1,836	4.70
Subtotal [b]		38,088	610	10,506	3.60

- Continued -

Appendix B-2. (Page 4 of 5)

YEAR	DATE	CATCH	FISHERMEN	FISHERMEN HOURS	CATCH PER HOUR (CPUE)
1982	June 28	1,943	352	1,408	1.38
	June 30	2,064	483	1,932	1.07
	July 02	1,095	434	1,736	0.63
	July 05	875	372	2,232	0.39
	July 08	748	435	2,610	0.29
	July 12	307	354	2,124	0.14
Total		45,120	610	22,548	2.00
1983	June 13	7,445	489	2,934	2.54
	June 16	5,961	450	2,700	2.21
Subtotal [b]		13,406	544	5,634	2.38
	June 20	4,776	474	2,844	1
	June 23	3,287	450	2,700	1
	June 27	2,566	446	2,676	0.96
	June 30	2,359	547	3,282	0.72
	July 04	1,213	443	2,658	0.46
	July 07	1,202	496	2,976	0.40
	July 11	633	466	2,796	0.23
Total		16,036	619	25,566	0.63
1984	June 18	10,845	484	2,904	3.73
	June 21	6,336	443	2,658	2.38
Total		17,181	520	5,562	3.08
	June 25	3,018	466	2,796	1.08
	June 28	2,625	470	2,820	0.93
	July 02	1,988	483	2,898	0.69
	July 05	1,218	426	2,556	0.48
	July 09	1,211	496	2,976	0.41
	July 12	858	436	2,616	0.33
	July 16	744	373	2,238	0.33
Total		28,843	587	24,462	1

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Appendix B-2. (Page 5 of 5)

YEAR	DATE	CATCH	FISHERMEN	FISHERMEN HOURS	CATCH PER HOUR (CPUE)
1985 [c]	June 20	6,519	423	2,538	2.07
	June 24	10,413	488	2,928	3.56
	June 27	8,791	492	2,952	2.98
	July 01	6,168	514	3,084	2.00
	July 04	3,774	460	2,760	1.37
Total		35,665	2,377	14,262	11.98
1986 [c]	June 26	7,786	514	3,084	2.52
	June 30	4,200	576	3,456	1.22
	July 03	3,224	556	3,336	0.97
	July 07	1,805	586	3,516	0.51
	July 10	1,156	532	3,192	0.36
otal		18,171	2,764	16,584	5.58
1987	June 18	18,336	526	4,208	4.36
	June 24				
	June 30				
	July 03	5,970	580	3,480	1.72
	July 07	3,636	578	3,468	1.05
	July 11	1,910	597	3,582	0.53
	July 15	1,415	569	3,414	0.41
	July 20	1,227	551	3,306	0.37
	Aug. 06	207	590	3,540	0.06
	Aug. 13	103	604	3,624	0.03
	Aug. 17	76	595	3,570	0.02
Total		4,862	2,911	17,466	0.28

[a] The catch totals exclude small numbers of chinook salmon taken in late July and August.
[b] Unrestricted mesh size.
[c] Preliminary harvest figures.

Appendix Table B-3. Comparative sockeye salmon catches by fishir period by year in District 1, Lower Kuskokw River, 1981 - 1987.[a]

YEAR	DATE	CATCH	FISHERMEN	FISHERMEN HOURS	CATCH PER HOUR (CPUE)
1981	June 10	48	489	2,934	0.02
	June 16	316	541	3,246	0.10
	June 22	3,852	511	3,066	1.26
	June 25	6,037	508	3,048	1.98
	June 30	12,262	484	2,904	4.22
	July 02	9,769	459	2,754	3.55
	July 06	5,510	461	2,766	1.99
	July 09	7,760	440	2,640	2.94
Total		45,554	613	23,358	1.95
1982	June 14	321	464	2,784	0.12
	June 17	1,061	496	2,892	0.37
	June 21	2,432	499	2,994	0.81
	June 24	3,157	459	1,836	1.72
	June 28	9,938	352	1,408	7.06
	June 30	5,824	483	1,932	3.
	July 02	3,110	434	1,736	1.
	July 05	2,769	372	2,232	1.24
	July 08	1,786	435	2,610	0.68
	July 12	638	354	2,124	0.30
Total		31,036	610	22,548	1.38
1983	June 13	114	489	2,934	0.04
	June 16	156	450	2,700	0.06
	June 20	3,289	474	2,844	1.16
	June 23	4,807	450	2,700	1.78
	June 27	10,465	446	2,676	3.91
	June 30	12,490	547	3,282	3.81
	July 04	24,540	443	2,658	9.23
	July 07	7,286	496	2,976	2.45
	July 11	3,001	466	2,796	1.07
Total		66,148	619	25,566	2.59
1984	June 18	409	484	2,904	0.14
	June 21	2,618	443	2,658	0.98
	June 25	10,743	466	2,796	3.84
	June 28	10,942	470	2,820	3.8

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Appendix Table B-3. (Page 2 of 2)

YEAR	DATE	CATCH	FISHERMEN	FISHERMEN HOURS	CATCH PER HOUR (CPUE)
1984	July 02	8,145	483	2,898	2.81
	July 05	6,798	426	2,556	2.66
	July 09	2,821	496	2,976	0.95
	July 12	2,188	436	2,616	0.84
	July 16	1,121	373	2,238	0.50
Total		45,785	587	24,462	1.87
1985 [b]	June 20	5,246	423	2,538	2.07
	June 24	25,536	488	2,928	8.72
	June 27	26,155	492	2,952	8.86
	July 01	31,082	514	3,084	10.08
	July 04	16,114	460	2,760	5.84
Total		104,133	2,377	14,262	7.30
1986 b	June 26	40,468	514	3,084	13.12
	June 30	22,633	576	3,456	6.55
	July 03	15,766	556	3,336	4.73
	July 07	8,347	586	3,516	2.37
	July 10	5,488	532	3,192	1.72
Total		92,702	2,764	16,584	5.59
1987	June 18	9,102	526	4,208	2.16
	June 24	24,355	607	4,856	5.02
	June 30	39,112	564	4,512	8.67
	July 03	44,030	580	3,480	12.65
	July 07	9,196	578	3,468	2.65
	July 11	4,611	597	3,582	1.29
	July 15	2,301	569	3,414	0.67
	July 20	774	551	3,306	0.23
Total		99,250	2,888	18,456	5.38

[a] Total catches exclude small numbers of sockeye salmon taken in late July and August.
[b] Preliminary harvest figures.

Appendix Table B-4. Comparative chum salmon catches by fishing period by year in District 1, Lower Kuskokwi River, 1971 - 1987.[a]

YEAR	DATE	CATCH	FISHERMEN	FISHERMEN HOURS	CATCH PER HOUR (CPUE)
1971	June 28-29	11,386	150	180	6.30
	July 01-02	8,949	111	1,332	6.70
	July 05-06	17,672	104	1,248	14.20
	July 08-09	12,603	93	1,116	11.30
	July 12-13	2,550	18	216	11.80
	July 15-16	8,000	69	828	9.70
	July 19-20	5,989	71	852	7.00
Totals		67,149	216	7,392	9.10
1972	June 29-30	9,863	87	1,044	9.40
	July 03-04	19,084	115	1,380	13.80
	July 06-07	19,839	101	1,212	16.40
	July 10-11	13,972	113	1,356	10.30
	July 13-14	6,290	80	960	6.60
Totals		69,048	176	5,952	11.
1973	June 25-26	19,073	202	2,424	7.90
	June 28-29	47,258	250	6,000	7.90
	July 02-03	21,410	242	2,904	7.40
	July 05-06	31,056	212	2,544	12.20
	July 09-10	24,593	217	2,604	9.40
Totals		143,390	341	16,476	8.70
1974	June 27	27,017	267	1,602	16.90
	July 01-02	55,356	380	4,560	12.10
	July 04-05	27,211	282	3,384	8.00
	July 08-09	50,672	376	4,512	11.20
	July 18	190	1,140	6	
Totals		166,917	467	15,198	11.00
1975	June 30	31,216	279	1,674	18.60
	July 03	35,525	360	2,160	16.00
	July 07	39,369	396	2,214	17.80

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Appendix Table B-4. (Page 2 of 4)[a]

YEAR	DATE	CATCH	FISHERMEN	FISHERMEN HOURS	CATCH PER HOUR (CPUE)
1975	July 10	39,910	304	1,824	21.90
	July 14	21,092	326	1,956	10.80
Totals		167,112	539	9,828	17.00
1976	June 28	42,464	348	2,088	20.30
	July 01	44,024	415	2,490	17.70
	July 08	48,669	381	2,286	21.30
	July 12	21,153	377	2,262	9.40
	July 15	14,176	265	1,590	8.90
Totals		170,486	517	10,716	15.90
1977	June 27	40,321	378	2,268	17.80
	June 30	58,884	409	2,454	24.00
	July 04	37,500	331	1,986	18.90
	July 07	56,943	368	2,208	25.80
	July 14	24,765	385	2,310	10.70
Totals		218,413	522	11,226	19.50
1978	June 26	44,296	449	2,694	16.40
	June 29	36,793	442	2,652	13.90
	July 03	26,629	476	2,856	9.30
	July 06	48,031	485	5,820	8.30
	July 10	48,931	428	5,136	9.50
	July 13	14,935	422	2,532	5.90
Totals		219,615	617	21,690	10.10
1979	June 22	32,295	502	3,012	10.70
	June 26	53,648	531	3,186	16.80
	June 29	48,643	542	3,252	14.90
	July 03	83,164	542	3,252	25.60
	July 10	32,434	520	3,120	10.40
Totals		250,184	617	15,822	15.80

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Appendix Table B-4. (Page 3 of 4)[a]

YEAR	DATE	CATCH	FISHERMEN	FISHERMEN HOURS	CATCH PER HOUR (CPUE)
1980	June 23	105,825	436	2,616	40.50
	June 26	131,945	408	2,448	53.90
	July 02	122,613	383	2,298	53.40
	July 09	90,233	431	2,586	34.90
Totals		450,616	579	9,948	45.20
1981	June 22	78,168	511	3,066	25.50
	June 25	81,431	508	3,048	26.70
	June 30	51,942	484	2,904	17.90
	July 02	58,594	459	2,754	21.30
	July 06	55,799	461	2,766	20.20
	July 09	66,138	440	2,640	25.00
Totals		392,072	613	17,178	22.80
1982	June 28	58,528	352	1,408	41.60
	June 30	47,773	483	1,932	24.70
	July 02	38,918	434	1,736	22.40
	July 05	29,315	372	2,232	13.10
	July 08	28,942	435	2,610	11.90
	July 12	20,709	354	2,124	9.80
Totals		224,185	576	12,042	18.60
1983	June 20	28,915	474	2,844	10.20
	June 23	24,625	450	2,700	9.10
	June 27	44,802	446	2,676	16.70
	June 30	55,209	547	3,282	16.80
	July 04	46,176	443	2,658	17.40
	July 07	36,965	496	2,976	12.40
	July 11	20,560	466	2,769	7.40
Totals		257,252	619	19,905	12.90
1984	June 25	91,773	466	2,796	32.80
	June 28	67,120	470	2,820	23.80
	July 02	69,897	483	2,898	24.10

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Appendix Table B-4. (Page 4 of 4)[a]

YEAR	DATE	CATCH	FISHERMEN	FISHERMEN HOURS	CATCH PER HOUR (CPUE)
1984	July 05	54,981	426	2,556	21.50
	July 09	36,440	496	2,976	12.10
	July 12	24,269	436	2,616	9.30
	July 16	18,613	373	2,238	8.30
Totals		363,093	587	18,900	19.20
1985 [b]	June 20	19,762	423	2,538	7.79
	June 24	42,778	488	2,928	14.61
	June 27	47,443	492	2,952	16.07
	July 01	47,471	514	3,084	15.39
	July 04	28,581	460	2,760	10.36
Total		186,035	2,377	14,262	13.04
986 [b]	June 26	68,947	514	3,084	22.36
	June 30	60,780	576	3,456	17.59
	July 03	65,839	556	3,336	19.74
	July 07	55,983	586	3,516	15.92
	July 10	48,990	532	3,192	15.35
Total		92,702	2,764	16,584	18.12
1987 [b]	June 18	13,472	526	4,208	3.20
	June 24	54,454	607	4,856	11.21
	June 30	112,963	564	4,512	25.04
	July 03	66,783	580	3,480	19.19
	July 07	103,059	578	3,468	29.72
	July 11	72,118	597	3,582	20.13
	July 15	71,923	569	3,414	21.07
	July 20	62,044	551	3,306	18.77
	Aug. 08	4,074	590	3,540	1.15
	Aug. 13	894	604	3,624	0.25
Total		561,784	5,766	37,990	14.79

[a] Total catches exclude small numbers of chum salmon taken in late July and August.
Preliminary harvest figures.

Appendix B-5. Lower Kuskokwim River, District 1, and the middle Kuskokwim River, District 2, combined commercial salmon harvest, 1960 - 1987.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1960	5,969	0	2,498	0	0	8,467
1961	18,918	0	5,044	0	0	23,962
1962	15,341	0	12,432	0	0	27,773
1963	12,016	0	15,660	0	0	27,676
1964	17,149	0	28,613	0	0	45,762
1965	21,989	0	12,191	0	0	34,180
1966	25,545	0	22,985	0	0	48,530
1967	29,986	0	56,313	0	148	86,447
1968	34,278	0	127,306	0	187	161,771
1969	43,997	322	83,765	0	7,165	135,249
1970	39,290	117	38,601	44	1,664	79,716
1971	40,274	2,606	5,253	0	68,914	117,047
1972	39,454	102	22,579	8	78,619	140,762
1973	32,838	369	130,876	33	148,746	312,862
1974	18,664	136	147,269	84	171,887	338,040
1975	21,720	23	81,945	10	181,840	285,538
1976	30,735	2,971	88,501	133	177,864	300,204
1977	35,830	9,379	241,364	203	248,721	535,497
1978	45,641	733	213,393	5,832	248,656	514,255
1979	38,966	1,054	219,060	78	261,874	521,032
1980	35,881	360	222,012	803	483,211	742,267
1981	47,663	48,375	211,251	292	418,677	726,258
1982	48,234	33,154	447,117	1,748	278,306	808,559
1983	33,174	68,855	196,287	211	267,698	566,225
1984	31,742	48,575	623,447	2,942	423,718	1,130,424
1985	37,889	106,647	335,606	75	199,478	679,695
1986	19,414	95,433	659,988	3,422	309,213	1,087,470
1987	36,179	136,602	399,467	43	574,336	1,146,627
FIVE YEAR AVERAGE (1982-1986)	34,091	70,533	452,489	1,680	295,683	854,476

Appendix B-6. Kuskokwim River escapement of chum salmon by age and sex, 1982-1987.

Sex	Sample Size	Total years of life at maturity[a]. 3	4	5	6	Total
1982: Aniak River[b]						
Male	371	0.0	35.8	29.2	0.7	65.7
Female	194	0.0	24.6	9.7	0.0	34.3
Combined	565	0.0	60.4	38.9	0.7	100.0
Total Esc.[c]		0	234,913	151,557	2,756	389,226
1982: Kogrukluk River[d]						
Male	147	0.0	39.2	17.8	0.0	57.0
Female	111	0.0	31.7	10.9	0.4	43.0
Combined	258	0.0	70.9	28.7	0.4	100.0
Total Esc.[c]		0	36,320	14,686	198	51,204
1982: Salmon River[d]						
Male	18	0.0	62.1	13.8	0.0	75.9
Female	7	0.0	24.1	0.0	0.0	24.1
Combined	25	0.0	86.2	13.8	0.0	100.0
Total Esc.[e]						
1983: Aniak River[b]						
Male	137	0.0	6.1	70.4	0.0	76.5
Female	42	0.0	6.7	16.8	0.0	23.5
Combined	179	0.0	12.8	87.2	0.0	100.0
Total Esc.[c]		0	14,760	100,109	0	114,869
1983: Kogrukluk River[d]						
Male	280	0.0	9.6	47.6	1.0	58.2
Female	201	0.4	12.3	28.5	0.6	41.8
Combined	481	0.4	21.9	76.1	1.6	100.0
Total Esc.[e]		37	1,964	6,846	150	8,997
1984: Aniak River[b]						
Male	69	0.0	50.5	14.6	1.9	67.0
Female	34	0.0	21.3	10.7	1.0	33.0
Combined	103	0.0	71.8	25.3	2.9	100.0
Total Esc.[c]		0	197,760	69,484	8,017	275,261
1984: Kogrukluk River[b]						
Male	840	0.0	50.8	13.7	2.0	66.5
Female	408	0.0	23.8	8.4	1.3	33.5
Combined	1,248	0.0	74.6	22.1	3.3	100.0
Total Esc.[c]		0	30,934	9,170	1,380	41,484

-continued-

Appendix B-6. (continued)

1985: Aniak River[b]						
Male	88	0.0	18.5	32.7	1.2	52.4
Female	80	0.0	22.6	25.0	0.0	47.6
Combined	168	0.0	41.1	57.7	1.2	100.0
Total Esc.[c]		0	90,825	127,508	2,652	220,985
1985: Kogrukluk River[b]						
Male	478	0.2	15.9	38.1	0.5	54.7
Female	396	0.0	14.4	30.9	0.0	45.3
Combined	874	0.2	30.3	69.0	0.5	100.0
Total Esc.[b]		30	4,546	10,351	75	15,002
1986: Kogrukluk River[b]						
Male	359	0.2	26.0	9.7	0.8	36.7
Female	209	0.2	43.7	17.8	1.6	63.3
Combined	568	0.4	69.7	27.5	2.4	100.0
Total Esc.[f]						
1986: Kisaralik River[g]						
Male	478	0.0	13.6	27.3	0.0	40.9
Female	396	0.0	13.6	45.5	0.0	59.1
Combined	874	0.0	27.2	72.8	0.0	100.0
Total Esc.[f]						
1987: Kogrukluk River[b]						
Male						
Female						
Combined						
Total Esc.[f]						
1987: Aniak River[g]						
Male						
Female						
Combined						
Total Esc.[f]						

a Total years of life at maturity represents the total number of freshwater and marine annuli, plus one.
b Allocation by age and sex based on weir samples.
c Escapement based on weir counts.
d Allocation by age and sex based on 4.25 in (11 cm), 5.5 in (14 cm), and 8.5 in (22 cm) stretch mesh gill net samples.
e Escapement estimate based on adjusted sonar counts.
f No escapement estimates available.
g Allocation by age and sex based on 'hook and line' samples.

Appendix B-7. Kuskokwim River commercial and subsistence and sex, 1982-1987

Sex	Sample Size	Total years of life at maturity[a] 3	4	5	6	Total
1982:						
Male	258	0.7	31.1	18.8	0.6	51.2
Female	166	0.5	35.8	12.1	0.4	48.8
Combined	424	1.2	66.9	30.9	1.0	100.0
Total Harvest [b]		5,620	313,321	144,718	4,683	468,342
1983:						
Male	814	0.4	20.3	26.5	1.0	48.2
Female	833	0.6	25.5	25.4	0.3	51.8
Combined	1,647	1.0	45.8	51.9	1.3	100.0
Total Harvest [b]		4,766	218,262	247,332	6,195	476,555
1984:						
Male	773	0.3	37.4	4.8	0.7	43.2
Female	1,052	0.5	51.3	4.8	0.2	56.8
Combined	1,825	0.8	88.7	9.6	0.9	100.0
Total Harvest [b]		4,584	508,267	55,010	5,157	573,018
1985:						
Male	476	0.3	16.4	29.3	0.3	46.3
Female	553	0.4	18.4	34.8	0.1	53.7
Combined	1,029	0.7	34.8	64.1	0.4	100.0
Total Harvest [b]		2,039	101,382	186,741	1,165	291,328
1986: Commercial Harvest						
Male	502	0.2	35.9	10.4	0.2	46.7
Female	562	0.3	41.0	11.7	0.3	53.3
Combined	1,064	0.5	76.9	22.1	0.5	100.0
Comm. Harvest [b]		1,546	237,785	68,336	1,647	309,213
1986: Subsistence Harvest						
Male		0.0	25.0	7.0	0.0	32.0
Female		0.0	58.8	8.3	0.9	68.0
Combined	228	0.0	83.8	15.3	0.9	100.0

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Appendix B-7. (continued)

Subsist. Harvest		0	78,471	14,327	843	93,641
1987: Commercial Harvest						
Male						0.0
Female						0.0
Combined	0	0.0	0.0	0.0	0.0	0.0
Comm. Harvest	[b]	0	0	0	0	
1987: Subsistence Harvest[c]						
Male						0.0
Female						0.0
Combined		0.0	0.0	0.0	0.0	0.0
Subsist. Harvest		0	0	0	0	

[a] Total years of life at maturity represents the total number of freshwater and marine annuli, plus one.
[b] Allocation by age and sex based on commercial harvest samples.
[c] Allocation by age class based on subsistence harvest samples, and allocation by sex based on commercial harvest samples.

Appendix B-8. Kuskokwim River chinook salmon cumulative mean tidal test fishing CPUE and percent by day, 1984-87.

Date	CPUE				Percent			
	1984	1985	1986	1987	1984	1985	1986	1987
06/04	0.00	0.00		0.00	0.0	0.0	0.0	0.0
06/05	1.43	0.00		5.10	0.5	0.0	0.0	0.9
06/06	1.43	0.00		8.39	0.5	0.0	0.0	1.4
06/07	2.58	0.00		12.89	0.9	0.0	0.0	2.2
06/08	2.58	0.00	0.00	29.25	0.9	0.0	0.0	5.0
06/09	2.58	0.00	2.93	38.37	0.9	0.0	1.5	6.6
06/10	2.58	0.00	4.36	58.83	0.9	0.0	2.2	10.1
06/11	3.30	0.00	5.82	76.58	1.2	0.0	2.9	13.2
06/12	7.10	0.00	10.32	98.39	2.6	0.0	5.2	16.9
06/13	11.00	0.00	10.32	111.84	4.0	0.0	5.2	19.2
06/14	14.64	0.00	11.60	132.81	5.4	0.0	5.8	22.8
06/15	18.25	0.00	11.60	142.89	6.7	0.0	5.8	24.6
06/16	25.32	0.00	11.60	154.06	9.3	0.0	5.8	26.5
06/17	35.39	0.00	11.60	207.83	13.0	0.0	5.8	35.7
06/18	43.45	0.00	11.60	221.89	15.9	0.0	5.8	38.1
06/19	55.32	0.00	13.06	234.87	20.3	0.0	6.5	40.4
06/20	64.67	0.00	21.88	253.26	23.7	0.0	10.9	43.5
06/21	76.40	1.43	41.83	276.63	28.0	1.3	20.9	47.5
06/22	83.83	7.95	55.51	306.29	30.7	7.0	27.7	52.6
06/23	111.48	7.95	59.47	332.74	40.8	7.0	29.7	57.2
06/24	125.63	10.62	74.02	341.85	46.0	9.3	37.0	58.7
06/25	132.42	10.62	76.77	379.40	48.5	9.3	38.3	65.2
06/26	146.74	15.08	94.13	399.75	53.7	13.2	47.0	68.7
06/27	150.43	15.08	108.90	425.23	55.1	13.2	54.4	73.1
06/28	157.92	17.63	123.08	439.81	57.8	15.5	61.5	75.6
06/29	164.10	25.87	136.52	458.25	60.1	22.7	68.2	78.7
06/30	171.30	34.53	137.61	470.54	62.7	30.3	68.7	80.9
07/01	173.55	38.31	143.01	485.92	63.5	33.6	71.4	83.5
07/02	180.39	50.54	147.80	495.39	66.0	44.3	73.8	85.1
07/03	190.98	51.82	147.80	498.43	69.9	45.4	73.8	85.6
07/04	193.59	60.49	150.69	506.47	70.9	53.0	75.2	87.0
07/05	199.62	66.91	153.52	513.03	73.1	58.6	76.6	88.2
07/06	207.65	76.31	160.57	522.07	76.0	66.9	80.2	89.7
07/07	216.55	84.72	166.08	536.69	79.3	74.2	82.9	92.2
07/08	221.79	87.45	172.70	536.69	81.2	76.6	86.2	92.2
07/09	230.89	92.76	175.78	537.99	84.5	81.3	87.8	92.4
07/10	233.41	97.89	178.71	541.05	85.5	85.8	89.2	93.0
07/11	237.96	99.32	180.14	543.27	87.1	87.0	89.9	93.3
07/12	240.49	101.72	181.60	545.44	88.0	89.1	90.7	93.7

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Appendix B-8. (continued)

07/13	242.94	103.15	185.85	547.79	88.9	90.4	92.8	94.1
07/14	250.06	104.61	188.59	548.90	91.6	91.7	94.2	94.3
07/15	250.06	104.61	188.59	548.90	91.6	91.7	94.2	94.3
07/16	250.91	106.47	190.41	548.90	91.9	93.3	95.1	94.3
07/17	251.80	106.47	190.41	551.45	92.2	93.3	95.1	94.8
07/18	251.80	107.43	190.41	551.45	92.2	94.1	95.1	94.8
07/19	251.80	107.43	192.41	565.90	92.2	94.1	96.1	97.2
07/20	256.09	107.43	192.41	566.83	93.8	94.1	96.1	97.4
07/21	260.80	107.43	192.41	568.94	95.5	94.1	96.1	97.8
07/22	262.58	107.43	192.41	568.94	96.1	94.1	96.1	97.8
07/23	262.58	107.43	192.41	572.30	96.1	94.1	96.1	98.3
07/24	264.32	107.43	192.41	572.30	96.8	94.1	96.1	98.3
07/25	265.99	107.43	192.41	572.30	97.4	94.1	96.1	98.3
07/26	265.99	107.43	194.36	572.30	97.4	94.1	97.0	98.3
07/27	265.99	107.43	196.31	576.52	97.4	94.1	98.0	99.1
07/28	265.99	109.43	196.31	576.52	97.4	95.9	98.0	99.1
07/29	266.84	109.43	200.29	576.52	97.7	95.9	100.0	99.1
07/30	266.84	111.24	200.29	576.52	97.7	97.5	100.0	99.1
07/31	268.44	111.24	200.29	576.52	98.3	97.5	100.0	99.1
08/01	268.44	111.24	200.29	576.52	98.3	97.5	100.0	99.1
08/02	268.44	111.24	200.29	576.52	98.3	97.5	100.0	99.1
08/03	268.44	111.24	200.29	577.66	98.3	97.5	100.0	99.3
08/04	268.44	111.24	200.29	577.66	98.3	97.5	100.0	99.3
08/05	271.46	111.24	200.29	577.66	99.4	97.5	100.0	99.3
08/06	273.13	111.24	200.29	577.66	100.0	97.5	100.0	99.3
08/07	273.13	111.24	200.29	579.82	100.0	97.5	100.0	99.6
08/08	273.13	111.24	200.29	579.82	100.0	97.5	100.0	99.6
08/09	273.13	113.11	200.29	579.82	100.0	99.1	100.0	99.6
08/10	273.13	113.11	200.29	579.82	100.0	99.1	100.0	99.6
08/11	273.13	113.11	200.29	581.98	100.0	99.1	100.0	100.0
08/12	273.13	113.11	200.29	581.98	100.0	99.1	100.0	100.0
08/13	273.13	113.11	200.29	581.98	100.0	99.1	100.0	100.0
08/14	273.13	113.11	200.29	581.98	100.0	99.1	100.0	100.0
08/15	273.13	113.11	200.29	581.98	100.0	99.1	100.0	100.0
08/16	273.13	113.11	200.29	581.98	100.0	99.1	100.0	100.0
08/17	273.13	113.11	200.29	581.98	100.0	99.1	100.0	100.0
08/18	273.13	113.11	200.29	581.98	100.0	99.1	100.0	100.0
08/19	273.13	113.11	200.29	581.98	100.0	99.1	100.0	100.0
08/20	273.13	113.11	200.29	581.98	100.0	99.1	100.0	100.0
08/21	273.13	114.11	200.29	581.98	100.0	100.0	100.0	100.0
	t = 6/22	t = 6/28	t = 6/22					

Estimated passage based on 1984 calibration (344.44 fish/index): 200,458
Estimated passage based on 1985 calibration (573.59 fish/index): 333,819
Estimated passage based on 1986 calibration (356.94 fish/index): 207,733
Estimated passage based on 1987 calibration (405.10 fish/index): 235,761

Appendix B-9. Kuskokwim River sockeye salmon cumulative mean tidal test fishing CPUE and percent by day, 1984-87.

Date	CPUE				Percent			
	1984	1985	1986	1987	1984	1985	1986	1987
06/04	0.00	0.00		6.00	0.0	0.0	0.0	0.2
06/05	0.00	0.00		6.00	0.0	0.0	0.0	0.2
06/06	0.00	0.00		9.16	0.0	0.0	0.0	0.3
06/07	0.00	0.00		18.24	0.0	0.0	0.0	0.7
06/08	0.00	0.00	0.00	35.20	0.0	0.0	0.2	1.3
06/09	0.00	0.00	0.00	47.88	0.0	0.0	0.0	1.7
06/10	0.00	0.00	0.00	63.59	0.0	0.0	0.0	2.3
06/11	2.74	0.00	0.00	79.69	0.5	0.0	0.0	2.9
06/12	2.74	0.00	6.00	191.48	0.5	0.0	0.2	6.9
06/13	2.74	0.00	14.19	240.02	0.5	0.0	0.6	8.7
06/14	2.74	0.00	26.90	248.74	0.5	0.0	1.1	9.0
06/15	7.74	0.00	29.83	290.44	1.3	0.0	1.2	10.5
06/16	7.74	0.00	64.51	458.25	1.3	0.0	2.5	16.6
06/17	9.88	0.00	70.37	710.22	1.7	0.0	2.8	25.7
06/18	16.31	0.00	81.80	779.25	2.8	0.0	3.2	28.2
06/19	16.31	0.00	87.65	795.77	2.8	0.0	3.4	28.8
06/20	23.15	0.00	135.34	842.80	4.0	0.0	5.3	30.5
06/21	29.84	0.00	240.35	918.81	5.2	0.0	9.4	33.3
06/22	51.95	0.00	292.69	1084.79	9.0	0.0	11.5	39.3
06/23	51.95	2.73	374.90	1439.68	9.0	0.2	14.7	52.1
06/24	66.05	16.06	494.34	1581.97	11.4	1.0	19.4	57.3
06/25	86.45	16.06	528.58	1630.56	14.9	1.0	20.7	59.1
06/26	96.92	28.31	675.91	1692.74	16.7	1.7	26.5	61.3
06/27	108.78	39.56	853.53	1726.76	18.8	2.4	33.4	62.5
06/28	144.39	137.03	915.85	1768.21	24.9	8.3	35.9	64.0
06/29	182.95	137.03	949.20	1805.49	31.6	8.3	37.2	65.4
06/30	201.48	272.39	1180.74	1969.28	34.8	16.5	46.3	71.3
07/01	241.57	399.91	1384.89	2210.54	41.7	24.2	54.3	80.1
07/02	258.80	526.23	1592.82	2273.34	44.7	31.8	62.4	82.3
07/03	271.03	643.34	1745.30	2308.94	46.8	38.9	68.4	83.6
07/04	293.63	899.47	1768.45	2433.12	50.7	54.4	69.3	88.1
07/05	334.46	1049.11	2000.09	2599.05	57.7	63.4	78.4	94.1
07/06	359.46	1239.04	2017.83	2611.11	62.0	74.9	79.1	94.6
07/07	395.13	1292.77	2115.48	2655.42	68.2	78.1	82.9	96.2
07/08	437.13	1360.76	2200.54	2661.91	75.4	82.3	86.2	96.4
07/09	451.05	1393.68	2232.55	2691.50	77.9	84.2	87.5	97.5
07/10	498.15	1438.91	2279.78	2721.81	86.0	87.0	89.3	98.6
07/11	525.04	1495.40	2313.20	2726.08	90.6	90.4	90.6	98.7
07/12	542.45	1553.09	2386.70	2729.32	93.6	93.9	93.5	98.9

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Appendix B-9. (continued)

07/13	544.85	1556.09	2407.92	2736.18	94.0	94.1	94.3	99.1
07/14	546.52	1578.69	2428.27	2740.72	94.3	95.4	95.1	99.3
07/15	548.99	1584.41	2429.25	2743.78	94.8	95.8	95.2	99.4
07/16	548.99	1596.82	2437.46	2743.78	94.8	96.3	95.5	99.4
07/17	549.86	1602.67	2460.69	2745.88	94.9	96.9	96.4	99.5
07/18	552.72	1607.39	2480.26	2745.88	95.4	97.2	97.2	99.5
07/19	562.42	1609.34	2495.97	2751.91	97.1	97.3	97.8	99.7
07/20	564.02	1609.34	2497.97	2755.10	97.3	97.3	97.9	99.8
07/21	569.24	1618.61	2505.57	2755.10	98.2	97.8	98.2	99.8
07/22	573.22	1622.15	2512.99	2755.10	98.9	98.1	98.5	99.8
07/23	573.22	1625.83	2518.55	2755.10	98.9	98.3	98.7	99.8
07/24	575.17	1629.23	2522.44	2755.10	99.3	98.5	98.8	99.8
07/25	576.08	1634.69	2526.19	2755.10	99.4	98.8	99.0	99.8
07/26	576.08	1639.42	2534.13	2755.10	99.4	99.1	99.3	99.8
07/27	576.08	1647.86	2538.13	2755.10	99.4	99.6	99.4	99.8
07/28	577.78	1650.84	2540.03	2755.10	99.7	99.8	99.5	99.8
07/29	579.38	1650.84	2540.03	2755.10	100.0	99.8	99.5	99.8
07/30	579.38	1650.84	2540.03	2755.10	100.0	99.8	99.5	99.8
07/31	579.38	1652.58	2540.03	2755.10	100.0	99.9	99.5	99.8
08/01	579.38	1652.58	2542.25	2755.10	100.0	99.9	99.6	99.8
08/02	579.38	1652.58	2542.25	2757.26	100.0	99.9	99.6	99.9
08/03	579.38	1652.58	2544.36	2759.08	100.0	99.9	99.7	99.9
08/04	579.38	1652.58	2546.47	2759.08	100.0	99.9	99.8	99.9
08/05	579.38	1652.58	2546.47	2759.08	100.0	99.9	99.8	99.9
08/06	579.38	1652.58	2547.65	2759.08	100.0	99.9	99.8	99.9
08/07	579.38	1652.58	2547.65	2759.08	100.0	99.9	99.8	99.9
08/08	579.38	1654.28	2547.65	2759.08	100.0	100.0	99.8	99.9
08/09	579.38	1654.28	2547.65	2759.08	100.0	100.0	99.8	99.9
08/10	579.38	1654.28	2547.65	2759.08	100.0	100.0	99.8	99.9
08/11	579.38	1654.28	2548.77	2759.08	100.0	100.0	99.9	99.9
08/12	579.38	1654.28	2548.77	2761.03	100.0	100.0	99.9	100.0
08/13	579.38	1654.28	2548.77	2761.03	100.0	100.0	99.9	100.0
08/14	579.38	1654.28	2548.77	2761.03	100.0	100.0	99.9	100.0
08/15	579.38	1654.28	2551.42	2761.03	100.0	100.0	100.0	100.0
08/16	579.38	1654.28	2551.42	2761.03	100.0	100.0	100.0	100.0
08/17	579.38	1654.28	2551.42	2761.03	100.0	100.0	100.0	100.0
08/18	579.38	1654.28	2551.42	2761.03	100.0	100.0	100.0	100.0
08/19	579.38	1654.28	2551.42	2761.03	100.0	100.0	100.0	100.0
08/20	579.38	1654.28	2551.42	2761.03	100.0	100.0	100.0	100.0
08/21	579.38	1654.28	2552.33	2761.03	100.0	100.0	100.0	100.0
		t = 6/30	t = 6/27					

Estimated passage based on 1985 calibration (219.18 fish/index) 588,596
Estimated passage based on 1986 calibration (170.28 fish/index) 470,148
Estimated passage based on 1987 calibration (162.25 fish/index) 447,977

Appendix B-10. Kuskokwim River coho salmon cumulative mean tidal test fishing CPUE and percent by day, 1984-87.

Date	CPUE				Percent			
	1984	1985	1986	1987	1984	1985	1986	1987
07/12	1.20	0.00	0.00	0.00	0.0	0.0	0.0	0.0
07/13	1.20	0.00	0.00	0.00	0.0	0.0	0.0	0.0
07/14	1.20	0.00	0.00	0.00	0.0	0.0	0.0	0.0
07/15	1.20	0.00	1.95	0.00	0.0	0.0	0.0	0.0
07/16	2.77	0.95	3.95	0.00	0.1	0.1	0.1	0.0
07/17	4.10	2.58	5.77	0.00	0.1	0.2	0.1	0.0
07/18	7.38	2.58	9.58	0.00	0.2	0.2	0.2	0.0
07/19	13.27	4.28	18.30	0.00	0.4	0.3	0.4	0.0
07/20	22.22	7.92	28.48	0.00	0.7	0.5	0.7	0.0
07/21	26.49	13.38	40.38	0.00	0.9	0.8	0.9	0.0
07/22	29.94	28.13	48.28	6.86	1.0	1.8	1.1	0.3
07/23	36.72	28.13	64.60	8.00	1.2	1.8	1.5	0.4
07/24	45.34	31.13	115.78	8.00	1.5	2.0	2.7	0.4
07/25	56.66	48.53	145.02	9.33	1.9	3.1	3.4	0.5
07/26	72.69	68.94	169.21	12.44	2.4	4.4	3.8	0.6
07/27	95.47	72.84	215.47	16.77	3.1	4.6	5.0	0.8
07/28	127.76	89.11	235.03	19.12	4.2	5.7	5.4	1.0
07/29	186.39	128.49	299.22	30.82	6.1	8.2	6.9	1.5
07/30	341.38	147.70	351.25	36.57	11.2	9.4	8.1	1.8
07/31	491.49	167.26	374.26	38.99	16.1	10.6	8.7	1.9
08/01	685.94	205.18	652.43	52.58	22.4	13.0	15.1	2.6
08/02	768.74	233.46	746.52	91.21	25.1	14.8	17.3	4.5
08/03	1049.98	290.47	1111.80	171.16	34.3	18.4	25.7	8.5
08/04	1094.97	348.34	1498.02	227.98	35.8	22.1	34.7	11.4
08/05	1183.67	377.84	1721.22	253.08	38.7	24.0	39.9	12.6
08/06	1318.09	463.01	1933.28	297.23	43.1	29.4	44.8	14.8
08/07	1350.88	603.28	2143.00	392.45	44.2	38.4	49.6	19.6
08/08	1456.24	690.83	2230.28	435.19	47.6	43.9	51.6	21.7
08/09	1534.14	799.03	2372.52	470.39	50.2	50.7	54.9	23.5
08/10	1588.52	895.90	2651.21	505.69	52.0	56.9	61.4	25.2
08/11	1699.42	1096.89	2733.77	537.78	55.6	69.6	63.3	26.8
08/12	1782.52	1189.69	3024.08	710.75	58.3	75.5	70.0	35.5
08/13	1819.06	1256.13	3120.72	822.94	59.5	79.7	72.3	41.1

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Appendix B-10. (continued)

08/14	1842.84	1286.55	3186.35	1145.02	60.3	81.7	73.8	57.1
08/15	1841.84	1347.63	3351.68	1291.29	60.2	85.5	77.6	64.4
08/16	1957.20	1416.05	3402.46	1405.49	64.0	89.9	78.8	70.1
08/17	2169.25	1493.82	3442.86	1487.97	71.0	91.0	79.7	74.2
08/18	2463.54	1456.96	3351.16	1540.32	80.6	92.5	82.2	76.8
08/19	2645.59	1460.96	3636.66	1556.27	86.5	92.7	84.2	77.6
08/20	2649.83	1473.84	3669.76	1568.67	86.7	93.6	85.0	78.1
08/21	2676.81	1490.96	3761.87	1582.23	87.6	94.6	87.1	78.9
08/22	2794.53	1490.96	3813.28	1590.46	91.4	94.6	88.3	79.3
08/23	2816.86	1499.53	3940.85	1611.34	92.1	95.2	91.2	80.4
08/24	2826.18	1507.53	4020.29	1636.04	92.4	95.7	93.1	81.6
08/25	2860.23	1519.24	4214.29	1647.55	93.6	96.4	97.6	82.2
08/26	2876.87	1519.24	4303.70	1662.75	94.1	96.4	99.6	82.9
08/27	2892.33	1529.24	4319.08	1693.34	94.6	97.1	100.0	84.5
08/28	2908.41	1567.37	4319.08	1736.90	95.1	99.5	100.0	86.6
08/29	2952.76	1575.37	4319.08	1762.79	96.6	100.0	100.0	87.9
08/30	2971.70	1575.37	4319.08	1807.40	97.2	100.0	100.0	90.2
08/31	2997.26	1575.37	4319.08	1807.40	98.0	100.0	100.0	90.2
09/01	3005.29	1575.37	4319.08	1827.55	98.3	100.0	100.0	91.2
09/02	3015.78	1575.37	4319.08	1858.61	98.6	100.0	100.0	92.7
09/03	3019.26	1575.37	4319.08	1898.87	98.8	100.0	100.0	94.7
09/04	3022.82	1575.37	4319.08	1911.64	98.9	100.0	100.0	95.4
09/05	3049.99	1575.37	4319.08	1943.42	99.8	100.0	100.0	96.9
09/06	3057.23	1575.37	4319.08	1956.58	100.0	100.0	100.0	97.6
09/07	3057.23	1575.37	4319.08	1974.06	100.0	100.0	100.0	98.5
09/08	3057.23	1575.37	4319.08	1982.13	100.0	100.0	100.0	98.9
09/09	3057.23	1575.37	4319.08	2001.15	100.0	100.0	100.0	99.8
09/10	3057.23	1575.37	4319.08	2004.71	100.0	100.0	100.0	100.0
09/11	3057.23	1575.37	4319.08	2004.71	100.0	100.0	100.0	100.0
	t = 8/9	t = 8/8	t = 8/7					

Estimated passage based on 1984 calibration (265.27 fish/index) 531,789
Estimated passage based on 1985 calibration (384.87 fish/index) 771,553
Estimated passage based on 1986 calibration (222.66 fish/index) 446,369
Estimated passage based on 1987 calibration (336.34 fish/index) 674,264

Appendix B-11. Kuskokwim River chum salmon cumulative mean tidal test fishing CPUE and percent by day, 1984-87.

	CPUE				Percent			
Date	1984	1985	1986	1987	1984	1985	1986	1987
06/04	0.00	0.00		0.00	0.0	0.0	0.0	0.0
06/05	0.00	0.00		3.33	0.0	0.0	0.0	0.1
06/06	0.00	0.00		15.72	0.0	0.0	0.0	0.3
06/07	0.00	0.00		21.80	0.0	0.0	0.0	0.4
06/08	4.72	0.00	0.00	30.98	0.2	0.0	0.0	0.6
06/09	4.72	0.00	0.00	45.39	0.2	0.0	0.0	0.9
06/10	4.72	0.00	6.00	51.54	0.2	0.0	0.1	1.1
06/11	4.72	0.00	15.02	72.42	0.2	0.0	0.4	1.5
06/12	7.03	0.00	15.02	85.73	0.3	0.0	0.4	1.8
06/13	17.03	0.00	23.36	104.82	0.7	0.0	0.6	2.1
06/14	27.47	0.00	51.82	107.68	1.2	0.0	1.2	2.2
06/15	29.97	0.00	57.68	117.41	1.3	0.0	1.4	2.4
06/16	44.87	0.00	69.45	159.47	1.9	0.0	1.7	3.3
06/17	52.68	0.00	78.74	281.04	2.2	0.0	1.9	5.7
06/18	63.39	2.79	78.74	321.87	2.7	0.2	1.9	6.6
06/19	68.30	2.79	87.52	327.73	2.9	0.2	2.1	6.7
06/20	99.66	5.46	125.57	387.74	4.2	0.4	3.0	7.9
06/21	140.76	8.31	171.47	412.14	5.9	0.6	4.1	8.4
06/22	215.92	16.50	295.12	612.60	9.1	1.2	7.0	12.5
06/23	224.98	24.62	402.66	715.11	9.4	1.9	9.6	14.6
06/24	245.39	89.83	553.94	763.16	10.3	6.8	13.2	15.6
06/25	302.18	204.61	623.52	828.92	12.7	15.4	14.9	16.9
06/26	307.34	207.28	710.66	928.43	12.9	15.6	16.9	19.0
06/27	424.53	231.82	841.95	1015.31	17.8	17.5	20.1	20.7
06/28	608.25	259.80	1046.17	1120.31	25.5	19.6	24.9	22.9
06/29	831.68	262.80	1164.37	1388.59	34.9	19.8	27.7	28.4
06/30	863.32	315.23	1637.08	1634.54	36.3	23.7	39.0	33.4
07/01	1001.18	380.16	1817.37	1786.62	42.0	28.6	43.3	36.5
07/02	1067.68	438.44	1934.94	1906.36	44.8	33.0	46.1	38.9
07/03	1071.05	462.90	1970.68	1940.55	45.0	34.9	47.0	39.6
07/04	1172.17	642.88	1976.54	2002.61	49.2	48.4	47.1	40.9
07/05	1321.65	819.67	2094.99	2179.79	55.5	61.8	49.9	44.5
07/06	1449.27	896.43	2101.35	2568.87	60.8	67.5	50.1	52.5
07/07	1537.24	927.58	2179.86	3031.56	64.5	69.9	51.9	61.9
07/08	1807.20	951.70	2378.76	3069.94	75.9	71.7	56.7	62.7
07/09	1844.76	957.16	2502.17	3341.57	77.5	72.1	59.6	68.2
07/10	1947.94	996.97	2810.37	3549.82	81.8	75.1	67.0	72.5
07/11	1995.79	1022.08	2950.84	3612.40	83.8	77.0	70.3	73.8
07/12	2047.87	1114.92	3018.51	3665.03	86.0	84.0	71.9	74.8
07/13	2086.65	1117.92	3092.24	3751.86	87.6	84.2	73.7	76.6

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Appendix B-11. (continued)

07/14	2093.28	1123.37	3338.46	4006.89	87.9	84.6	79.6	81.8
07/15	2109.10	1123.37	3372.86	4068.38	88.6	84.6	80.4	83.1
07/16	2124.82	1123.37	3460.28	4101.24	89.2	84.6	82.5	83.7
07/17	2132.24	1126.30	3623.10	4208.09	89.5	84.9	86.3	85.9
07/18	2223.44	1136.67	3756.79	4333.04	93.4	85.6	89.5	88.5
07/19	2247.55	1136.67	3782.21	4535.47	94.4	85.6	90.1	92.6
07/20	2262.22	1136.67	3792.21	4705.66	95.0	85.6	90.4	96.1
07/21	2276.29	1142.21	3808.35	4728.70	95.6	86.1	90.8	96.6
07/22	2291.91	1173.82	3855.00	4740.30	96.2	88.4	91.9	96.8
07/23	2300.50	1183.06	3897.87	4748.36	96.6	89.1	92.9	97.0
07/24	2318.34	1201.69	3947.42	4776.44	97.3	90.5	94.1	97.5
07/25	2322.75	1208.96	3983.41	4817.09	97.5	91.1	94.9	98.4
07/26	2330.43	1213.50	4035.10	4837.04	97.8	91.4	96.2	98.8
07/27	2336.60	1225.49	4068.67	4841.37	98.1	92.3	97.0	98.9
07/28	2340.97	1231.39	4094.62	4847.33	98.3	92.8	97.6	99.0
07/29	2348.07	1233.39	4123.88	4852.03	98.6	92.9	98.3	99.1
07/30	2351.44	1242.75	4142.31	4854.39	98.7	93.6	98.7	99.1
07/31	2359.00	1248.97	4144.31	4855.60	99.0	94.1	98.8	99.1
08/01	2364.96	1250.94	4148.04	4859.94	99.3	94.2	98.8	99.2
08/02	2365.61	1255.30	4155.15	4863.24	99.3	94.6	99.0	99.3
08/03	2367.28	1265.11	4167.52	4872.33	99.4	95.3	99.3	99.5
08/04	2370.07	1268.92	4172.22	4883.53	99.5	95.6	99.4	99.7
08/05	2372.67	1269.90	4172.22	4886.72	99.6	95.7	99.4	99.8
08/06	2378.42	1269.90	4176.83	4890.93	99.9	95.7	99.5	99.9
08/07	2380.12	1270.73	4176.83	4890.93	99.9	95.7	99.5	99.9
08/08	2380.12	1272.43	4181.12	4890.93	99.9	95.9	99.6	99.9
08/09	2380.12	1280.63	4181.12	4893.13	99.9	96.5	99.6	99.9
08/10	2380.12	1280.63	4181.12	4895.44	99.9	96.5	99.6	100.0
08/11	2380.12	1284.63	4183.79	4897.60	99.9	96.8	99.7	100.0
08/12	2380.12	1290.35	4184.72	4897.60	99.9	97.2	99.7	100.0
08/13	2380.12	1290.35	4184.72	4897.60	99.9	97.2	99.7	100.0
08/14	2380.12	1290.35	4187.14	4897.60	99.9	97.2	99.8	100.0
08/15	2380.12	1326.35	4187.14	4897.60	99.9	99.9	99.8	100.0
08/16	2380.12	1327.37	4187.14	4897.60	99.9	100.0	99.8	100.0
08/17	2380.12	1327.37	4187.14	4897.60	99.9	100.0	99.8	100.0
08/18	2380.12	1327.37	4187.14	4897.60	99.9	100.0	99.8	100.0
08/19	2380.12	1327.37	4189.09	4897.60	99.9	100.0	99.8	100.0
08/20	2381.72	1327.37	4196.43	4897.60	100.0	100.0	100.0	100.0
08/21	2381.72	1327.37	4196.43	4897.60	100.0	100.0	100.0	100.0
	t = 7/1	t = 7/4	t = 7/2					

Estimated	passage	based on 1984	calibration	(448.42 fish/index)	2,196,182
Estimated	passage	based on 1985	calibration	(386.11 fish/index)	1,891,012
Estimated	passage	based on 1986	calibration	(194.38 fish/index)	951,995
Estimated	passage	based on 1987	calibration	(275.55 fish/index)	1,349,534

Appendix B-12. Commercial coho salmon catches by week, lower Kuskokwim River (District 1), 1974-1987.

Year	Date	Catch	Fishermen	Fishermen Hours	Catch/Hr.
1974	Aug 01-02	9,576	267	3,444	2.8
	Aug 05-08	59,090	444	31,968	1.8
	Aug 12-15	58,066	396	28,512	2.0
	Aug 19-22	12,301	263	18,936	0.6
	Aug 26-29	5,360	107	7,704	0.7
	Sept 2-05	430	25	1,815	0.2
	Totals	144,823	516	92,379	1.6
1975	Aug 10	2,357	142	852	2.8
	Aug 04-06	12,500	292	14,016	0.9
	Aug 11-13	18,551	373	17,904	1.0
	Aug 18-20	34,435	388	18,624	1.9
	Aug 25-27	16,277	270	12,960	1.3
	Totals	84,120	533	64,356	1.3
1976	Aug 02-03	10,534	286	6,864	1.5
	Aug 09-11	29,728	400	19,200	1.5
	Aug 16-18	28,664	387	18,576	1.5
	Aug 23-25	14,543	300	14,400	1.0
	Aug 30-31	4,420	174	7,308	0.6
	Totals	87,889	516	66,348	1.3
1977	Aug 01-02	23,987	1,360	8,640	2.8
	Aug 03-10	91,474	487	23,376	3.9
	Aug 15-16	60,935	438	10,512	5.8
	Aug 18	25,589	378	4,536	5.6
	Aug 22	16,980	361	4,332	3.9
	Aug 25	11,874	264	3,168	3.7
	Aug 29	6,819	204	2,448	2.8
	Totals	237,658	572	57,012	4.2
1978	Aug 01	6,311	297	3,564	1.8
	Aug 04	9,455	364	4,368	2.2
	Aug 08	20,501	433	5,196	3.9
	Aug 11	42,428	485	5,820	7.3
	Aug 15	48,950	476	5,712	8.6
	Aug 18	29,485	434	5,208	5.7

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Appendix B-12. (continued)

	Aug 22	22,287	396	4,752	4.7
	Aug 25	11,168	293	3,516	3.2
	Aug 29	12,215	250	3,000	4.1
	Totals	202,800	597	41,136	4.9
1979	Aug 02	52,276	478	5,736	9.1
	Aug 06	53,797	480	2,880	18.7
	Aug 09	26,422	497	2,982	8.9
	Aug 13	27,915	463	2,778	10.0
	Aug 16	21,675	467	2,802	7.7
	Aug 20	19,445	390	2,340	8.3
	Aug 23	5,376	328	1,968	2.7
	Aug 27	6,342	310	3,720	1.7
	Aug 30	2,182	179	2,148	1.0
	Totals	215,430	613	27,354	7.9
1980	Aug 02	9,889	375	2,250	4.4
	Aug 07	36,126	455	2,730	13.2
	Aug 11	35,178	482	2,892	12.2
	Aug 14	28,211	439	2,634	10.7
	Aug 18	43,748	441	2,646	16.5
	Aug 21	33,274	419	2,514	13.2
	Aug 25	19,264	370	2,220	8.7
	Aug 28	13,484	319	1,914	7.0
	Totals	219,174	586	19,800	11.1
1981	Aug 03	16,184	430	2,580	6.3
	Aug 06	13,885	441	2,646	5.2
	Aug 10	26,972	445	2,670	10.1
	Aug 13	46,252	473	2,838	16.3
	Aug 17	34,739	458	2,748	12.6
	Aug 20	24,184	380	2,280	10.6
	Aug 24	23,771	372	2,232	10.7
	Aug 27	13,785	346	2,076	6.6
	Aug 31	8,096	278	1,668	4.9
	Totals	207,868	586	21,738	9.6
1982	July 29	19,561	416	2,496	7.8
	Aug 02	31,944	388	2,328	13.7
	Aug 05	35,766	455	2,670	13.4
	Aug 09	61,231	442	2,652	23.1
	Aug 12	80,685	449	2,694	29.9
	Aug 16	77,785	420	2,520	30.9

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Appendix B-12. (continued)

	Aug 19	49,566	403	2,418	20.5
	Aug 23	25,218	349	2,094	12.0
	Aug 26	26,761	314	1,884	14.2
	Aug 30	26,815	302	1,812	14.8
	Totals	435,332	596	23,568	18.5
1983	Aug 01	9,767	377	2,262	4.3
	Aug 04	15,389	430	2,580	6.0
	Aug 08	34,541	383	2,298	15.0
	Aug 11	35,268	485	2,910	12.1
	Aug 15	24,072	462	2,772	8.7
	Aug 18	22,822	408	2,448	9.3
	Aug 22	34,918	388	2,328	15.0
	Aug 26	19,039	323	1,938	9.8
	Totals	195,816	577	19,536	10.0
1984	July 30	56,609	459	2,754	20.6
	Aug 02	79,240	401	2,406	32.9
	Aug 06	84,406	542	4,878	17.3
	Aug 09	80,990	523	4,707	17.2
	Aug 13	80,268	504	4,536	17.7
	Aug 16	78,342	502	4,518	17.3
	Aug 20	63,829	491	4,419	14.4
	Aug 23	49,372	481	4,329	11.4
	Aug 27	16,472	350	3,150	5.2
	Aug 30	11,222	210	1,890	5.9
	Sept 03	1,603	690	360	4.5
	Sept 06	1,877	39	234	8.0
	Totals	604,230	619	38,181	15.8
1985	Aug 01	34,052	487	2,922	11.7
	Aug 05	54,819	527	3,162	17.3
	Aug 08	78,149	525	3,150	24.8
	Aug 12	77,809	530	3,180	24.5
	Aug 15	28,013	441	2,646	10.6
	Aug 19	19,316	406	2,436	7.9
	Aug 22	17,534	390	2,340	7.5
	Aug 26	10,688	297	1,782	6.0
	Aug 29	9,568	262	1,572	6.1
	Totals	329,948	627	23,190	14.2
1986	July 31	27,553	352	2,112	13.0

-continued-

Appendix B-12. (continued)

	Aug 04	96,127	530	3,180	30.2
	Aug 07	127,024	600	5,400	23.5
	Aug 11	82,215	553	3,318	24.8
	Aug 13	92,918	526	3,156	29.4
	Aug 15	55,633	519	3,114	17.9
	Aug 18	51,328	477	2,862	17.9
	Aug 21	50,640	465	2,790	18.2
	Aug 25	37,365	458	2,748	13.6
	Aug 28	16,436	346	2,076	7.9
	Sept 01	5,949	234	1,404	4.2
	Totals	643,188	663	32,160	20.0
1987	Aug 06	46,182	590	3,540	13.0
	Aug 13	104,968	604	3,624	29.0
	Aug 17	73,867	595	3,570	20.7
	Aug 19	45,277	585	3,510	12.9
	Aug 21	33,601	540	3,240	10.4
	Aug 24	27,607	500	3,000	9.2
	Aug 27	21,772	479	2,874	7.6
	Aug 31	12,873	364	2,184	5.9
	Sept 03	11,352	278	1,668	6.8
	Sept 07	4,311	132	792	5.4
	Totals	381,810	694	28,002	13.6

Appendix C-1. Historical age composition percentage, chinook salmon, Quinhagak commercial harvest and escapement, 1982 - 1987.

Age composition	Total years of life at maturity[a]. 3	4	5	6	7+	Total
1982 commercial sample size: 309						
Male	0.0	3.8	33.3	9.4	1.3	47.8
Female	0.0	1.3	31.1	18.4	1.8	52.4
Combined	0.0	4.9	64.4	27.8	2.9	100.0
Commercial Harvest[b]	0	1,083	14,236	6,145	641	22,106
1982 no escapement sockeye salmon samples were collected.						
1983 commercial sample size: 758						
Male	0.4	25.9	6.1	27.3	1.5	61.2
Female	0.0	0.1	0.8	37.0	0.9	38.8
Combined	0.4	26.0	6.9	64.3	2.4	100.0
Commercial Harvest[b]	166	12,060	3,201	29,828	1,113	46,385
1983 escapement sample size: 580						
Carcass samples only.						
Male	0.3	6.7	10.9	29.7	1.0	48.6
Female	0.0	0.2	2.4	45.8	3.0	51.4
Combined	0.3	6.9	13.3	75.5	4.0	100.0
Estimated Escapement[c]	148	3,403	6,558	37,231	1,972	49,312
1984 commercial sample size: 583						
Male	0.0	12.0	52.7	14.8	3.9	83.4
Female	0.0	0.0	1.5	10.1	5.0	16.6
Combined	0.0	12.0	54.2	24.9	8.9	100.0
Commercial Harvest[b]	0	4,038	18,239	8,379	2,995	33,652
1984 escapement sample size: 545						
Carcass samples only.						
Male	1.5	5.0	34.0	20.0	2.6	63.1
Female	0.0	0.0	4.3	28.5	4.1	36.9
Combined	1.5	5.0	38.3	48.5	6.7	100.0
Estimated Escapement[c]	574	1,912	35,973	14,648	18,549	38,245
1985 commercial sample size: 569						
Male	0.0	19.3	20.9	28.7	1.6	59.1
Female	0.0	0.0	2.5	28.3	0.7	40.9
Combined	0.0	19.3	23.4	55.0	2.3	100.0
Commercial Harvest[b]	0	5,867	7,114	16,721	699	30,401

-Continued-

1985 escapement sample size: 661						
Combined beach seine (n=131) and carcass (n=530) samples.						
Male	0.6	5.3	11.0	30.6	0.9	48.4
Female	0.0	0.0	3.7	45.5	2.4	51.6
Combined	0.6	5.3	14.7	76.1	3.3	100.0
Estimated Escapement[c]	215	1,895	5,258	27,210	1,180	35,755
1986 commercial sample size: 502[d]						
Male	2.0	6.0	43.0	16.0	4.0	71.0
Female	0.0	0.0	2.0	19.0	8.0	29.0
Combined	2.0	6.0	45.0	35.0	12.0	100.0
Commercial Harvest[b]	457	1,370	10,276	7,992	2,740	22,835
1986 sport fish sample size: 406[d]						
Male	0.0	8.3	37.7	10.8	5.9	63.5
Female	0.0	1.5	8.4	18.2	8.4	36.5
Combined	0.0	10.8	46.1	28.8	14.3	100.0
Estimated sport fish Harvest[e]	0	90	385	240	119	835
1986 escapement sample size:406[d]						
Combined beach seine (n=31) and carcass (n=188) samples.						
Male	1.5	6.0	21.2	18.1	6.0	52.8
Female	0.0	0.0	6.5	26.6	14.1	47.2
Combined	1.5	6.0	27.7	44.7	20.1	100.0
Escapement[c]	e	e	e	e	e	
1987 commercial sample size:						
Male						
Female						
Combined						
Commercial Harvest[b]	0	0	0	0		
1987 escapement sample size:						
Beach seine samples only.						
Male						
Female						
Combined						
Estimated Escapement[c]	f	f	f	f		

a The total years of life at maturity are represented by the follow European salmon age designations. European age designate the number of fresh water and marine annuli, respectively.
Age composition 3 includes 1.1 and small numbers of 0.2.
Age composition 4 includes 1.2 and small numbers of 0.3.
Age composition 5 includes 1.3 and small numbers of 0.4.
Age composition 6 includes 1.4 and small numbers of 2.3 and 0.5.
Age composition 7+ includes age compositions 1.5 and 2.4.

b Allocations by age class based on that years commercial catch sample results.

c Allocations by age class based on that years escapement sample results. Escapement estimate based on the Kenektok River salmon side scan sonar project.

d Preliminary data.

e Information not available.

Appendix C-2. Kanektok River peak aerial surveys by species, 1959 - 1987[a].

Year	SPECIES			
	Chinook	Sockeye	Coho	Chum
1960	6,047	34,900		36,100
1961				
1962	935	43,108		
1963				
1964				
1965				
1966	3,718			28,800
1967				
1968	4,170	8,000		14,000
1969				
1970	4,112	3,028		80,100
1971				
1972				
1973	814			
1974				
1975		6,018		
1976		2,936		8,697
1977	5,787	6,304		32,157
1978[b]	19,180	44,215		229,290
1979				
1980	6,172	113,931	69,325	25,950
1981[c]	15,900	49,175		71,840
1982[d]	8,142	55,940		
1983	8,890	2,340		9,360
1984[e]	12,182	30,840	46,830	48,360
1985	13,465	16,270		14,385
1986	3,643	14,949		16,790
1987	4,223	51,753	20,056	9,420
AVERAGE:	7,336	30,232	45,404	30,458
OBJECTIVE:	5,000	32,000	25,000	30,500

a Peak aerial surveys are those rated fair or good surveys obtained between 20 July and 5 August for chinook and sockeye salmon, 20-31 July for chum salmon, and 20 August and 5 September for coho salmon. Some surveys which do not meet these criteria may be referenced in this table; test are footnoted.

b Chum salmon count excluded from escapement objective calculation due to exceptional magnitude.

c Poor survey for chinook, sockeye, chum salmon.

d Late Survey for chinook, sockeye salmon (after 5 August).

e Poor coho survey.

Appendix C-3. Historical age composition percentage, soc' salmon, Quinhagak commercial harvest escapement, 1982 - 1987.

Age composition	Total years of life at maturity[a]. 3	4	5	6	Total
1982 commercial sample size:	203				
Male	0.0	17.2	38.0	0.0	55.2
Female	0.0	13.3	31.5	0.0	44.8
Combined	0.0	30.5	69.5	0.0	100.0
Commercial Harvest[b]	0	7,834	17,851	0	25,685
1982 no escapement sockeye salmon samples were collected.					
1983 commercial sample size:	470				
Male	0.0	23.0	20.9	4.0	47.9
Female	0.0	31.0	18.5	2.6	52.1
Combined	0.0	54.0	39.4	6.6	100.0
Commercial Harvest[b]	0	5,542	4,044	677	10,263
1983 no escapement sockeye salmon samples were collected.					
1984 commercial sample size:	531				
Male	0.0	17.1	34.5	4.9	56.5
Female	0.0	10.0	30.1	3.4	43.5
Combined	0.0	27.1	64.6	8.3	100.0
Commercial Harvest[b]	0	4,677	11,149	1,432	17,258
1984 escapement sample size:	382				
Carcass samples only.					
Male	0.3	22.8	36.7	1.5	61.3
Female	0.0	8.9	29.0	0.8	38.7
Combined	0.3	31.7	65.7	2.3	100.0
Estimated Escapement[c]	164	17,357	35,973	1,259	54,754
1985 commercial sample size:	569				
Male	0.0	9.3	40.4	1.6	59.1
Female	0.0	11.9	35.3	1.6	40.9
Combined	0.0	21.2	75.6	3.2	100.0
Commercial Harvest[b]	0	1,666	5,957	252	7,876

-Continued-

Appendix C-3 (page 2 of 2)

1985 escapement sample size: 26					
Combined beach seine (n=12) and carcass (n=14) samples.					
Male	0.0	19.2	27.0	0.0	46.2
Female	0.0	15.4	26.9	11.5	53.8
Combined	0.0	34.6	53.9	11.5	100.0
Estimated Escapement[c]	0	2,166	3,374	720	6,259
1986 commercial sample size: 314[d]					
Male	0.0	11.7	39.2	0.2	51.1
Female	0.0	9.8	39.2	0.0	48.9
Combined	0.0	21.4	78.3	0.2	100.0
Commercial Harvest[b]	0	4,607	16,827	50	21,484
1986 escapement sample size: 79[d]					
Beach seine samples only					
Male	0.0	10.1	26.6	0.0	36.7
Female	0.0	10.1	50.6	2.6	63.3
Combined	0.0	20.2	77.2	2.6	100.0
Estimated Escapement[c]	e	e	e	e	e
1987 commercial sample size:					
Male	0.0	0.0	0.0	0.0	
Female	0.0	0.0	0.0	0.0	
Combined	0.0	0.0	0.0	0.0	
Commercial Harvest[b]	0	0	0	0	
1987 escapement sample size:					
Beach seine samples only.					
Male					
Female					
Combined					
Estimated Escapement[c]	e	e	e	e	

a The total years of life at maturity are represented by the follow European salmon age designations. European age designate the number of fresh water and marine annuli, respectively.
Age composition 3 includes 1.1 and small numbers of 0.2.
Age composition 4 includes 1.2 and small numbers of 0.3.
Age composition 5 includes 1.3 and small numbers of 0.4.
Age composition 6 includes 1.4 and small numbers of 2.3 and 0.5.
Age composition 7+ includes age compositions 1.5 and 2.4.

b Allocations by age class based on that years commercial catch sample results.

c Allocations by age class based on that years escapement sample results. Escapement estimate based on the Kanektok River salmon side scan sonar project.

d Preliminary data.

e Information not available.

Apppendix C-4. Historical age composition percentage, chum salmon, Quinhagak commercial harvest and escapement, 1981 - 1987.

Age composition	Total years of life at maturity[a]. 3	4	5	6	Total
1982 commercial sample size: 414					
Male	1.0	24.6	13.7	1.0	40.3
Female	0.0	38.7	19.6	1.4	59.7
Combined	1.0	63.3	33.3	2.4	100.0
Commercial Harvest[b]	333	21,108	11,104	800	33,346
1982 no escapement chum salmon samples were collected.					
1983 commercial sample size: 482					
Male	0.0	24.7	16.0	0.6	41.3
Female	0.6	34.9	22.8	0.4	58.7
Combined	0.6	59.6	38.8	1.0	100.0
Commercial Harvest[b]	139	13,762	8,959	231	23,090
1983 escapement sample size: 401					
Gillnet samples only					
Male	0.0	15.5	37.6	1.0	54.1
Female	0.2	21.9	23.8	0.0	45.9
Combined	0.2	37.4	61.4	1.0	100.0
Estimated Escapement[c]	108	20,157	33,092	539	53,895
1984 commercial sample size: 464					
Male	0.2	33.8	13.4	0.0	47.4
Female	0.0	39.9	12.1	0.6	52.6
Combined	0.2	73.7	25.5	0.6	100.0
Commercial Harvest[b]	101	37,162	12,858	303	50,424
1984 escapement sample size: 772					
Carcass samples only					
Male	0.1	38.1	17.1	1.2	56.5
Female	0.1	32.0	11.1	0.3	43.5
Combined	0.2	70.1	28.2	1.5	100.0
Estimated Escapement[c]	400	140,298	56,439	3,002	200,140
1985 commercial sample size: 458					
Male	0.0	25.5	21.4	0.2	59.1
Female	0.0	27.5	25.3	0.0	40.9
Combined	0.0	53.0	46.7	0.2	100.0
Commercial Harvest[b]	0	10,822	9,535	41	20,418

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1985 escapement sample size: 440					
Combined beach seine (n=150) and carcass (n=290) samples.					
Male	0.2	24.1	27.1	0.0	51.4
Female	0.2	25.7	22.7	0.0	48.6
Combined	0.4	49.8	49.8	0.0	100.0
Estimated Escapement[c]	61	7,632	7,632	0	15,325
1986 commercial sample size: 314[d]					
Male	0.0	22.6	17.1	0.0	39.7
0 2504 8414					
Female	0.0	41.7	18.6	0.0	60.3
0 2103 8413					
Combined	0.0	64.3	35.7	0.0	100.0
Commercial Harvest[b]	0	19,097	10,603	0	29,700
1986 escapement sample size: 431[d]					
Beach seine samples only.					
Male	0.2	27.1	28.8	0.9	57.0
Female	0.0	23.0	19.3	0.7	43.0
Combined	0.2	50.1	48.1	1.6	100.0
Estimated Escapement[c]	e	e	e	e	e
1987 commercial sample size:					
Male					
Female					
Combined					
Commercial Harvest[b]	0	0	0	0	
1987 escapement sample size:					
Beach seine samples only.					
Male					
Female					
Combined					
Estimated Escapement[c]	e	e	e	e	

a Total years of life at maturity represents the number of winters between egg deposition by the parent fish and subsequent development and return of the mature fish for spawning. This is the sum of the two digits used for Gilbert-Rich age notation or the sum plus one of the two digits used for European notation.

b Allocations by age class based proportions from commercial catch sample results.

c Allocations by age class based on escapement sample results. Escapement estimate based on the Kanektok River salmon side scan sonar project.

d Preliminary data.

e Information not available.

Appendix C-5. Historical commercial harvest by period, Quinhagak District, sockeye salmon, 1981 - 1987.

Appendix Table C-5. Historical commercial harvest by period, Quinhagak District, sockeye salmon, 1981 - 1987.

Date	1981	1982	1983	1984	1985[a]	1986[a]	1987[a]
JUNE 10							
JUNE 11							
JUNE 12						b	
JUNE 13			14				
JUNE 14							
JUNE 15	89						
JUNE 16			150			b	
JUNE 17		1,119					
JUNE 18	355			435			468
JUNE 19						171	
JUNE 20					111		
JUNE 21		2,141		1,336			
JUNE 22	379						746
JUNE 23			343			1,371	
JUNE 24		1,595			638		
JUNE 25	732			1,640			1,292
JUNE 26						2,300	
JUNE 27			543		461		
JUNE 28		1,908		1,967			
JUNE 29	2/						
JUNE 30						2,601	1,360
JULY 1					975		
JULY 2	1,242	2,177		1,577			
JULY 3						3,604	2,244
JULY 4			627		1,201		
JULY 5		2,934		1,157			
JULY 6	1,126						
JULY 7		4,118	1,211			2,803	
JULY 8					1,289		
JULY 9	1,532	3,048		2,497			
JULY 10						2,786	
JULY 11			2,610	2,011	1,901		
JULY 12		1,601					
JULY 13	2,278			1,842			
JULY 14		1,426	1,605			3,134	
JULY 15	3,099				1,240		
JULY 16		1,293		564			
JULY 17	937					1,502	
JULY 18			1,321	657			
JULY 19		866					
JULY 20	1,722			477			
JULY 21		722				989	
JULY 22	1,312		799				
JULY 23		328		361			
JULY 24	907						
JULY 25			b	317			
JULY 26		b					

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Appendix C-5. (page 2 of 2)

JULY 27	b		150	202			
JULY 28		102					
JULY 29	429		126				
JULY 30		112		19			
JULY 31	97						
AUG. 1			157	53	42		
AUG. 2		38					
AUG. 3	272		137	30			73
AUG. 4		69				3	
AUG. 5	293		150		6		
AUG. 6		39		16		34	153
AUG. 7	240						
AUG. 8			b	30	b	b	
AUG. 9		6					
AUG. 10	77		69	15			38
AUG. 11		25				28	
AUG. 12	103		49		1		
AUG. 13		0		28		19	16
AUG. 14	44				1		
AUG. 15			42	12		32	
AUG. 16		0			3		
AUG. 17	9		71	1			25
AUG. 18		6				10	
AUG. 19	10		19		2		3
AUG. 20		9		3		27	
AUG. 21	3				0		7
AUG. 22			32	1		4	
AUG. 23		2			1		
AUG. 24	0			5			2
AUG. 25		1	28			2	
AUG. 26	0				2		3
AUG. 27		0		2		7	
AUG. 28	0				1		7
AUG. 29			7	1		5	
AUG. 30		0			0		
AUG. 31	0			1			20
SEPT. 1		b	0			8	
SEPT. 2	0				0		14
SEPT. 3		b		1		1	
SEPT. 4	5				0		18
SEPT. 5			0	0		b	
SEPT. 6		b			1		
SEPT. 7	0			0			0
SEPT. 8		b	3			b	
NUMBER OF PERIODS	33	34	28	33	23	28	19
HARVEST	17,292	25,685	10,263	17,258	7,876	21,483	6,489

Preliminary harvest figures.

b No commercial fishing due to fisherman strike, storm or no buyer present.

Appendix C-6. Historical commercial harvest by period, Quinhagak District, chum salmon, 1981 - 1987.

Date	1981	1982	1983	1984	1985[a]	1986[a]	1987[a]
June 10							
June 11							
June 12						b	
June 13			84				
June 14							
June 15	1,008						
June 16			787			b	
June 17		1,556					
June 18	2,611			1,809			1,162
June 19						1,198	
June 20					968		
June 21		2,278		4,471			
June 22	2,177						1,051
June 23			1,103			3,226	
June 24		1,403			3,228		
June 25	3,606			5,417			1,711
June 26						4,329	
June 27			1,855		1,874		
June 28		2,458		4,702			
June 29	b						
June 30						3,860	2,066
July 1					2,131		
July 2	3,500	1,972		6,034			
July 3						3,743	1,959
July 4			2,333		3,155		
July 5		1,820		2,768			
July 6	2,953						
July 7		4,016	3,069			3,708	
July 8					3,231		
July 9	7,408	3,830		5,610			
July 10						4,022	
July 11			2,966	4,567	2,552		
July 12		3,742					
July 13	7,438			4,270			
July 14		2,084	3,080			1,966	
July 15	10,756				2,796		
July 16		2,193		1,784			
July 17	3,218					2,326	
July 18			3,022	2,410			
July 19		2,339					
July 20	3,934			2,256			
July 21		1,827				1,143	
July 22	1,668		2,219				
July 23		791		1,316			
July 24	1,280						
July 25			b	1,397			
July 26		b					

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Appendix C-6. (page 2 of 2)

July 27	b		459	677			
July 28		333					
July 29	797		475				
July 30		232		173			
July 31	188					5	
Aug. 1			429	272	247		
Aug. 2		153					
Aug. 3	205		580	151			110
Aug. 4		134				4	
Aug. 5	297		357		143		
Aug. 6		112		95		52	285
Aug. 7	114						
Aug. 8			b	132	b	46	
Aug. 9		11					
Aug. 10	60		108	16			101
Aug. 11		37				27	
Aug. 12	46		53		15		
Aug. 13		2		53		8	19
Aug. 14	37				24		
Aug. 15			23	28		6	
Aug. 16		2			23		
Aug. 17	11		50	2			29
Aug. 18		9				9	
Aug. 19	7		14		5		9
Aug. 20		3		11		14	
Aug. 21	2				11		6
Aug. 22			18	1		2	
Aug. 23		3			9		
Aug. 24	0			2			6
Aug. 25		4	5			0	
Aug. 26	4				0		9
Aug. 27		2		0		2	
Aug. 28	2				4		4
Aug. 29			0	0		3	
Aug. 30		0			1		
Aug. 31	1			0			10
Sept. 1		b	1			1	
Sept. 2	4				1		7
Sept. 3		b		0		0	
Sept. 4	0				0		13
Sept. 5			0	0		b	
Sept. 6		b			0		
Sept. 7	2			0			0
Sept. 8		b	0			b	
Number of Periods	33	34	28	33	23	29	19
Harvest	53,334	33,346	23,090	50,424	20,418	29,700	8,557

a Preliminary harvest figures.
b No commercial fishing due to fisherman strike, storm or no buyer present.

Appendix C-7. Quinhagak District commercial salmon harvest, 1967-

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1960	0	5,649	3,000	0	0	8,649
1961	4,328	2,308	46	90	18,864	25,636
1962	5,526	10,313	0	4,340	45,707	65,886
1963	6,555	0	0	0	0	6,555
1964	4,081	13,422	379	939	707	19,528
1965	2,976	1,886	0	0	4,242	9,104
1966	278	1,030	0	268	2,610	4,186
1967	0	652	1,926	0	8,087	10,665
1968	8,879	5,884	21,511	75,818	19,497	131,589
1969	16,802	3,784	15,077	953	38,206	74,822
1970	18,269	5,393	16,850	15,195	46,556	102,263
1971	4,185	3,118	2,982	13	30,208	40,506
1972	15,880	3,286	376	1,878	17,247	38,667
1973	14,993	2,783	16,515	277	19,680	54,248
1974	8,704	19,510	10,979	43,642	15,298	98,133
1975	3,928	8,584	10,742	486	35,233	58,973
1976	14,110	6,090	13,777	31,412	43,659	109,048
1977	19,090	5,519	9,028	202	43,707	77,546
1978	12,335	7,589	20,114	47,033	24,798	111,86[illegible]
1979	11,144	18,828	47,525	295	25,995	103,7[illegible]
1980	10,387	13,221	62,610	21,671	65,984	173,87[illegible]
1981	24,524	17,292	47,557	160	53,334	142,867
1982	22,106	25,685	73,652	11,838	33,346	166,627
1983	46,385	10,263	32,442	168	23,090	112,348
1984	33,652	17,258	135,342	16,249	50,424	252,925
1985	30,401	7,876	29,992	28	20,418	88,715
1986	22,835	21,484	57,544	8,700	29,700	140,263
1987[a]	26,022	6,489	50,070	66	8,557	91,204
FIVE YEAR AVERAGE (1982-1986)	31,076	16,513	65,794	7,397	31,396	152,176

a Preliminary harvest figures.

Appendix C-8. Historical commercial harvest by period, Quinhagak District, Chinook salmon, 1981 - 1987.

Date	1981	1982	1983	1984	1985[a]	1986[a]	1987[a]
June 10							
June 11							
June 12						b	
June 13			7,720				
June 14							
June 15	2,948						
June 16			7,835			b	
June 17		3,527					
June 18	6,694			11,997			7614
June 19						5,801	
June 20					6,617		
June 21		4,268		5,458			
June 22	4,002						10586
June 23			11,652			6,276	
June 24		5,406			6,698		
June 25	3,719			4,112			4539
June 26						1,703	
June 27			9,711		3,795		
June 28		1,438		3,283			
June 29	b						
June 30						4,496	690
July 1					3,752		
July 2	1,853	1,204		1,902			
July 3						2,018	2319
July 4			2,727		4,068		
July 5		913		850			
July 6	996						
July 7		1,566	1,521			960	
July 8					2,407		
July 9	739	890		1,259			
July 10						736	
July 11			1,297	1,176	1,545		
July 12		687					
July 13	639			1,011			
July 14		680	1,351			406	
July 15	1,236				1,306		
July 16		533		441			
July 17	290					222	
July 18			845	445			
July 19		390					
July 20	490			412			
July 21		203				131	
July 22	211		629				
July 23		88		324			
July 24	187						
July 25			b	379			

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Appendix C-8. (page 2 of 2)

July 26		b					
July 27	b		114	194			
July 28		56					
July 29	116		103				
July 30		104		73			
July 31	41					0	
Aug. 1			153	67	93		
Aug. 2		53					
Aug. 3	72		160	40			53
Aug. 4		27				0	
Aug. 5	59		141		55		
Aug. 6		26		38		25	78
Aug. 7	43						
Aug. 8			b	71	b	11	
Aug. 9		6					
Aug. 10	54		125	28			62
Aug. 11		15				6	
Aug. 12	44		74		24		
Aug. 13		0		36		6	16
Aug. 14	29				6		
Aug. 15			43	28		8	
Aug. 16		1			10		
Aug. 17	11		66	2			15
Aug. 18		9				10	
Aug. 19	17		51		3		17
Aug. 20		6		10		6	
Aug. 21	5				4		13
Aug. 22			33	6		3	
Aug. 23		1			5		
Aug. 24	14			3			4
Aug. 25		6	16			1	
Aug. 26	6				5		6
Aug. 27		3		3		4	
Aug. 28	4				3		8
Aug. 29			7	1		3	
Aug. 30		0			1		
Aug. 31	2			0			1
Sept. 1		b	10			1	
Sept. 2	1				1		4
Sept. 3		b		2		2	
Sept. 4	2				2		2
Sept. 5			1	1		b	
Sept. 6		b			1		
Sept. 7	0			0			
Sept. 8		b	0			b	
Number of Periods	33	34	28	33	23	29	19
Harvest	24,524	22,106	46,385	33,652	30,401	22,835	26,022

a Preliminary harvest figures.
b No commercial fishing due to fisherman strike, storm or no buyer pre

Appendix C-09. Quinhagak District commercial effort 1970-1987.

YEAR	EFFORT[a]
1970	88
1971	61
1972	107
1973	109
1974	196
1975	127
1976	181
1977	258
1978	200
1979	206
1980	169
1981	186
1982	117
1983	226
1984	263
1985	300
1986	324
1987	310
1982-1986 FIVE YEAR AVERAGE	246

a Permits that made at least one delivery during that year.

Appendix D-1. Peak aerial survey results, Goodnews River, 1979-1987

Year	Species	Goodnews River[a]	Middle Fork[b]	South Fork	Total
1979	Chinook	635	1,032	c	1,667
	Sockeye	987	1,166	c	2,153
	Chum	8,349	3,375	c	11,724
1980	Chinook	1,228	1,164	c	2,392
	Sockeye	41,576	18,596	c	60,172
	Chum	1,975	3,782	c	5,757
1981	Chinook	c	c	c	c
	Sockeye	c	c	c	c
	Chum	c	c	c	c
1982	Chinook	1,990	1,546	c	3,536
	Sockeye	19,160	2,327	c	21,487
	Chum	9,700	6,300	c	16,000
1983	Chinook	2,600	2,500	141	5,241
	Sockeye	9,650	5,900	50	15,600
	Chum	c	c	c	c
1984	Chinook	3,235	2,020	6	5,261
	Sockeye	9,240	12,897	0	22,137
	Chum	17,250	9,172	925	27,347
1985	Chinook	3,535	2,050	c	5,585
	Sockeye	2,843	2,710	c	5,553
	Chum	4,415	3,593	c	8,008
1986	Chinook	1,068	1,249	c	2,317
	Sockeye	8,960	16,990	c	25,950
	Chum	11,850	4,400	c	16,250
1987	Chinook	2,234	1,598	38	3,870
	Sockeye	19,786	9,033	0	28,819
	Chum	12,103	2,805	680	15,588
Escapement Objectived	Chinook	1,600	800	c	2,400
	Sockeye	15,000	5,000	c	20,000
	Chum	17,000	4,000	c	21,000

a Includes Goodnews Lake.
b Includes Middle Fork Lakes
c Information not avaiable.
c Escapement objectives are preliminary and are subject to change a additional data becomes available. Escapement objectives are base on aerial index counts which do not represent total escapement, but do reflect annual spawner abundance trends when made using standa
survey methods under acceptable survey conditions.

Appendix Table D-2. Historical age composition percentage, chinook salmon, Goodnews Bay commercial harvest and escapement, 1982 - 1987.

Age composition	Total years of life at maturity.[a] 3	4	5	6	7+	Total
1982 commercial sample size: 107						
Male	0.0	5.6	37.4	11.2	0.0	54.2
Female	0.0	2.8	29.9	13.1	0.0	45.8
Combined	0.0	8.4	67.3	24.3	0.0	100.0
Commercial Harvest[b]	0	796	6,377	2,303	0	9,476
1982 no escapement samples were collected.						
1983 commercial sample size: 655						
Male	0.0	14.4	7.8	25.3	1.1	48.4
Female	0.0	0.2	0.6	48.8	2.0	51.6
Combined	0.0	14.8	8.2	74.1	3.1	100.0
Commercial Harvest[b]	0	2,061	1,158	10,461	438	14,117
1983 escapement sample size: 139						
Carcass samples.						
Male	0.0	0.0	9.4	39.5	2.9	51.8
Female	0.0	0.0	2.2	44.6	1.4	48.2
Combined	0.0	0.0	11.6	84.1	4.3	100.0
Estimated Escapement[c]	0	0	1,670	12,109	619	14,398
1984 commercial sample size: 500						
Male	0.2	7.6	32.4	22.4	5.4	68.0
Female	0.0	0.0	2.8	22.0	7.2	32.0
Combined	0.2	7.6	35.2	44.4	12.6	100.0
Commercial Harvest[b]	17	655	3,031	3,824	1,085	8,612
1984 escapement sample size: 111						
Carcass samples.						
Male	0.0	4.5	22.6	20.7	3.6	51.4
Female	0.0	0.0	4.5	39.6	4.5	48.6
Combined	0.0	4.5	27.1	60.3	0.0	100.0
Estimated Escapement[c]	0	393	2,369	5,272	0	8,743

-continued-

Appendix D-2. (continued)

1985 commercial sample size: 532						
Male	0.2	18.2	7.5	30.8	2.4	59.1
Female	0.0	10.0	4.5	25.2	1.1	40.9
Combined	0.2	28.2	12.0	56.0	3.6	100.0
Commercial Harvest[b]	12	1,634	695	3,244	208	5,793
1985 escapement sample size: 19						
Carcass samples.						
Male	0.0	0.0	0.0	21.0	5.3	59.1
Female	0.0	0.0	0.0	73.7	0.0	40.9
Combined	0.0	0.0	0.0	94.7	5.3	100.0
Estimated Escapement[c]	0	0	0	7,558	423	7,979
1986 commercial sample size: 363						
Male	0.0	17.0	49.0	16.0	4.0	86.0
Female	0.0	0.0	2.0	19.0	8.0	29.0
Combined	0.0	17.0	51.0	35.0	12.0	115.0
Commercial Harvest[b]	0	463	1,388	853	327	2,723
1986 escapement sample size: 1						
Beach seine sample.						
Male	0.0	0.0	0.0	0.0	0.0	0.0
Female	0.0	0.0	0.0	100.0	0.0	100.0
Combined	0.0	0.0	0.0	100.0	0.0	100.0
Estimated Escapement[c]	0	0	0	4,094	0	4,094
1987 commercial sample size: ___[d]						
Male						0.0
Female						0.0
Combined						0.0
Commercial Harvest[b]	0	0	0	0	0	
1987 escapement sample size	39[d]					
Beach seine sample.						
Male	0.1	0.1	0.3	0.0	0.5	0.9
Female	0.1	0.2	0.2	0.1	0.5	1.1
Combined	0.2	0.3	0.5	0.1	1.0	2.0
Estimated Escapement[c]	806	1,151	2,187	345	4,490	

-continued-

Appendix D-2. (continued)

a Total years of life at maturity are represented by the follow European salmon age designations. European age designate the number of fresh water and marine annuli, respectively.
   Age composition 3 includes 1.1 and small numbers of 0.2.
   Age composition 4 includes 1.2 and small numbers of 0.3.
   Age composition 5 includes 1.3 and small numbers of 0.4.
   Age composition 6 includes 1.4 and small numbers of 2.3 and 0.5.
   Age composition 7+ includes age compositions 1.5 and 2.4.

b Allocations by age class based on that years commercial catch sample results.

c Allocations by age class based on that years escapement sample results. Escapement estimate based on the Goodnews River salmon counting tower project.

d Preliminary data.

Appendix D-3. Historical estimated run size and commercial exploitation rate, Goodnews River, 1981 - 1987.

Year	Salmon	Middle Fork Towerr Estimate	Middle Fork Aerial Survey Count as a Percentage of Tower Estimate	Goodnews River Escapement Estimate	Goodnews Bay Subsistence Harvest Estimate	Goodnews Bay Commercial Harvest	Goodnews Bay Total Run Size Estimate	Commercial Exploitation Percentage of Run Size
1981[a]	Chinook	3,688	-	-	1,409	7,190	-	-
	Sockeye	49,188	-	-	3,511[b]	40,273	-	-
	Chum	21,827	-	-	-	13,842	-	-
1982[a]	Chinook	1,395	-	-	1,236	9,476	-	-
	Sockeye	58,255	-	-	2,754[b]	38,877	-	-
	Chum	6,767	-	-	-	13,628	-	-
1983	Chinook	8,027	36 %	14,398	1,066	14,117	29,581	48 %
	Sockeye	25,816	22 %	89,935	1,518[b]	11,716	83,189	14 %
	Chum	15,348	-	-	-	8,788	-	-
1984	Chinook	3,260	35 %	8,743	629	8,612	17,984	48 %
	Sockeye	32,033	27 %	87,213	984	15,474	83,631	18 %
	Chum	19,003	35 %	117,739	189	14,340	132,268	11 %
1985	Chinook	2,831	70 %	7,979	426	5,793	14,198	41 %
	Sockeye	24,131	11 %	50,481	704	6,698	57,883	12 %
	Chum	10,387	32 %	25,025	348	4,784	30,157	16 %
1986	Chinook	2,083	57 %	4,884	555	2,723	7,372	37 %
	Sockeye	51,069	28 %	93,228	942	22,608	118,778	19 %
	Chum	14,765	38 %	51,910	191	10,355	62,456	17 %
1987[c]	Chinook	2,274	100 %	4,490	816	3,357	8,663	39 %
	Sockeye	28,671	85 %	51,989	935	27,758	80,702	34 %
	Chum	17,519	58 %	37,802	578	20,381	58,761	35 %

a Incomplete aerial survey results.

b Subsistence caught chum salmon is included in subsistence sockeye salmon harvest.

c Preliminary figures.

Appendix Table D-4. Historical age composition percentage, sockeye salmon, Goodnews Bay commercial harvest and escapement, 1982 - 1987.

Age composition	Total years of life at maturity[a]. 3	4	5	6	Total
1982 commercial sample size:	102				
Male	0.0	3.9	43.1	10.8	57.8
Female	0.0	1.0	36.3	4.9	42.2
Combined	0.0	4.9	79.4	15.7	100.0
Commercial Harvest[b]	0	1,905	30,868	6,104	38,877
1982 no escapement sockeye salmon samples were collected.					
1983 commercial sample size:	404				
Male	0.0	19.0	31.3	4.2	54.5
Female	0.0	20.0	22.3	3.2	45.5
Combined	0.0	39.0	53.6	7.4	100.0
Commercial Harvest[b]	0	4,569	6,280	867	11,716
1983 escapement sample size:	18				
Carcass samples only.					
Male	0.0	72.2	11.1	0.0	83.3
Female	0.0	5.6	11.1	0.0	16.7
Combined	0.0	77.8	22.2	0.0	100.0
Estimated Escapement[c]	0	54,425	15,530	0	69,955
1984 commercial sample size:	549				
Male	0.0	14.8	45.1	2.2	62.1
Female	0.0	6.2	31.0	0.7	37.9
Combined	21.0	97.1	79.0	2.9	100.0
Commercial Harvestb	3,250	15,025	12,224	449	15,474
1984 escapement sample size:	47				
Carcass samples only.					
Male	0.0	23.4	27.7	0.0	51.1
Female	0.0	21.3	27.6	0.0	48.9
Combined	0.0	44.7	55.3	0.0	100.0
Estimated Escapement[c]	0	30,044	37,169	0	67,213

- Continued -

Appendix D-4. (continued)

Age composition	Total years of life at maturity[a] 3	4	5	6	Total
1985 commercial sample size: 488					
Male	0.0	10.7	43.6	0.0	59.1
Female	0.0	13.5	32.2	0.0	40.9
Combined	0.0	24.2	75.8	0.0	100.0
Commercial Harvest[b]	0	1,621	5,077	0	6,698
1985 escapement sample size: 17					
Carcass samples only.					
Male	0.0	17.7	47.0	0.0	64.7
Female	0.0	29.4	5.9	0.0	35.3
Combined	0.0	47.1	52.9	0.0	100.0
Estimated Escapement[c]	0	23,777	26,704	0	50,481
1986 commercial sample size: 488					
Male	0.0	5.1	49.8	0.0	54.9
Female	0.0	3.5	41.6	0.0	45.1
Combined	0.0	8.5	91.5	0.0	100.0
Commercial Harvest[b]	0	2,146	22,966	0	25,112
1986 escapement sample size: 91					
Beach seine samples only.					
Male	0.0	5.5	54.9	0.0	60.4
Female	1.1	2.2	36.3	0.0	39.6
Combined	1.1	7.7	91.2	0.0	100.0
Estimated Escapement[c]	1,026	7,179	85,024	0	93,228
1987 commercial sample size: ___[d]					
Male	0.0	0.0	0.0	0.0	0.0
Female	0.0	0.0	0.0	0.0	0.0
Combined	0.0	0.0	0.0	0.0	0.0
Commercial Harvest[b]	0	0	0	0	
1987 escapement sample size		577[d]			
Beach seine samples only.					
Male	0.0	0.5	0.0	0.0	0.5
Female	0.1	0.4	0.0	0.0	0.5
Combined	0.1	0.9	0.0	0.0	1.0
Estimated Escapement[c]	5,326	45,550	2,112	0	52,989

-continued-

Appendix D-4. (continued)

a The total years of life at maturity are represented by the follow European salmon age designations. European age designate the number of fresh water and marine annuli, respectively.
   Age composition 3 includes 1.1 and small numbers of 0.2.
   Age composition 4 includes 1.2 and small numbers of 0.3.
   Age composition 5 includes 1.3 and small numbers of 0.4.
   Age composition 6 includes 1.4 and small numbers of 2.3 and 0.5.
   Age composition 7+ includes age compositions 1.5 and 2.4.

b Allocations by age class based on that years commercial catch sample results.

c Allocations by age class based on that years escapement sample results. Escapement estimate based on the Goodnews River salmon counting tower project.

d Preliminary data.

Appendix D-5. Goodnews Bay District commercial salmon harvest, 1968 to 1987.

YEAR	CHINOOK	SOCKEYE	COHO	PINK	CHUM	TOTAL
1968			5,458			5,458
1969	3,978	6,256	11,631	298	5,006	27,169
1970	7,163	7,144	6,794	12,183	12,346	45,630
1971	477	330	1,771	0	301	2,879
1972	264	924	925	66	1,331	3,510
1973	3,543	2,072	5,017	324	15,781	26,737
1974	3,302	9,357	21,340	16,373	8,942	59,314
1975	2,156	9,098	17,889	419	5,904	35,466
1976	4,417	5,575	9,852	8,453	10,354	38,651
1977	3,336	3,723	13,335	29	6,531	26,954
1978	5,218	5,412	13,764	9,103	8,590	42,087
1979	3,204	19,581	42,098	201	9,298	74,382
1980	2,331	28,632	43,256	7,832	11,748	93,799
1981	7,190	40,273	19,749	11	13,642	80,865
1982	9,476	38,877	46,683	4,673	13,829	113,538
1983	14,117	11,716	19,660	0	6,766	52,2[illegible]
1984	8,612	15,474	71,176	4,711	14,340	114,[illegible]
1985	5,793	6,698	16,498	8	4,784	33,7[illegible]
1986	2,723	25,112	19,378	4,447	10,355	62,015
1987	3,357	27,758	29,057	54	20,381	80,607
Five year Average (1982-1987) 1981-85 Aug.	6,920	17,352	31,154	1,844	11,325	68,595

Appendix D-6. Average cumulative percent of estimated escapement by day for chinook, sockeye and chum salmon, Goodnews River counting tower project, 1981 - 1987[a].

Day	Date		Chinook Salmon	Sockeye Salmon	Chum Salmon
1	June	16	0.0	0.0	0.0
2	June	17	0.0	0.1	0.0
3	June	18	0.0	0.1	0.0
4	June	19	0.0	0.2	0.0
5	June	20	0.1	0.3	0.0
6	June	21	0.3	0.7	0.0
7	June	22	0.5	1.2	0.0
8	June	23	1.2	2.1	0.0
9	June	24	2.0	4.0	0.2
10	June	25	3.0	6.7	0.7
11	June	26	3.5	9.2	1.3
12	June	27	4.0	12.3	1.9
13	June	28	5.2	14.7	2.3
14	June	29	7.1	17.2	2.7
15	June	30	9.2	19.8	3.1
16	July	1	11.1	23.1	4.2
17	July	2	13.9	27.0	5.5
18	July	3	15.6	30.4	6.8
19	July	4	18.0	35.0	8.4
20	July	5	21.7	41.1	10.3
21	July	6	25.4	46.1	11.8
22	July	7	30.0	51.2	13.4
23	July	8	33.3	56.6	15.2
24	July	9	36.8	62.5	18.3
25	July	10	40.8	67.2	21.5
26	July	11	45.2	71.9	26.0
27	July	12	49.6	75.7	31.2
28	July	13	53.5	79.2	35.0
29	July	14	57.4	82.2	38.9
30	July	15	61.3	85.3	43.2
31	July	16	65.1	88.0	49.0
32	July	17	69.6	90.0	54.6
33	July	18	73.3	92.0	58.2
34	July	19	76.1	93.6	61.8
35	July	20	79.2	95.2	65.8
36	July	21	82.0	96.5	70.0
37	July	22	84.1	97.5	73.8

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Appendix D-6. (continued)

38	July	23	86.7	98.1	77.8
39	July	24	89.0	98.6	81.3
40	July	25	91.2	99.0	85.3
41	July	26	93.3	99.2	88.9
42	July	27	94.4	99.4	91.3
43	July	28	95.7	99.6	94.9
44	July	29	96.8	99.7	96.5
45	July	30	97.8	99.8	97.5
46	July	31	98.5	99.8	98.3
47	Aug.	1	98.8	99.9	98.7
48	Aug.	2	99.1	99.9	99.1
49	Aug.	3	99.4	100.0	99.6
50	Aug.	4	99.6	100.0	99.7
51	Aug.	5	99.8	100.0	99.7
52	Aug.	6	99.9	100.0	99.8
53	Aug.	7	99.9	100.0	99.8
54	Aug.	8	100.0	100.0	99.9
55	Aug.	9	100.0	100.0	99.9
56	Aug.	10	100.0	100.0	99.9
57	Aug.	11	100.0	100.0	99.9
58	Aug.	12	100.0	100.0	99.9
59	Aug.	13	100.0	100.0	100.0
60	Aug.	14	100.0	100.0	100.0
61	Aug.	15	100.0	100.0	100.0

a Average cumulative percentage observed for the years of 1981 - 1985. In 1986 the project's earlier termination date precluded assessment of the entire chinook, sockeye and chum salmon migration and not used in the average calculations. The project's normal termination date precludes adequate assessment of coho and pink salmon escapement.

Appendix D-7. Historical age composition percentage, chum salmon, Goodnews Bay commercial harvest and escapement, 1982 - 1987.

Age composition	Total years of life at maturity[a]. 3	4	5	6	Total
1982 commercial sample size: 135					
Male	0.0	16.3	20.0	0.0	36.3
Female	0.7	29.6	32.7	0.7	63.7
Combined	0.7	45.9	52.7	0.7	100.0
Commercial Harvest[b]	97	6,348	7,288	97	13,829
1982 no escapement chum salmon samples were collected.					
1983 commercial sample size: 216					
Male	0.9	15.3	22.7	0.5	39.4
Female	2.8	27.3	30.5	0.0	60.6
Combined	3.7	42.6	53.2	0.5	100.0
Commercial Harvest[b]	250	2,882	3,600	34	6,766
1983 escapement sample size: 174 Carcass samples only.					
Male	0.6	19.0	37.3	0.0	56.9
Female	0.6	15.5	27.0	0.0	43.1
Combined	1.2	34.5	64.3	0.0	100.0
Estimated Escapement[c]					
1984 commercial sample size: 457					
Male	0.0	30.6	15.3	2.0	47.9
Female	0.4	38.5	12.5	0.7	52.1
Combined	69.5	96.9	30.5	2.7	100.0
Commercial Harvest[b]	9,966	13,895	4,374	387	14,340
1984 escapement sample size: 90 Carcass samples only.					
Male	0.0	32.3	4.4	0.0	36.7
Female	0.0	56.6	6.7	0.0	63.3
Combined	0.0	88.9	11.1	0.0	100.0
Estimated Escapement[c]	0	104,670	13,069	0	117,739

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Appendix D-7. (continued)

Age composition	Total years of life at maturity[a] 3	4	5	6	Total
1985 commercial sample size: 270					
Male	0.0	27.8	14.4	0.0	59.1
Female	0.0	30.0	27.5	0.0	40.9
Combined	0.0	57.8	41.9	0.0	100.0
Commercial Harvest[b]	0	2,765	2,004	0	4,784
1985 escapement sample size: 46 Carcass samples only.					
Male	0.0	30.4	19.6	0.0	50.0
Female	0.0	28.3	21.7	0.0	50.0
Combined	0.0	58.7	41.3	0.0	100.0
Estimated Escapement[c]	0	14,690	10,335	0	25,025
1986 commercial sample size: 353[c]					
Male	0.2	37.7	12.2	0.2	50.3
Female	0.5	36.0	12.5	0.7	49.7
Combined	0.7	73.7	24.7	0.9	100.0
Commercial Harvest[b]	72	7,632	2,558	93	10,355
1986 escapement sample size: 21[d] Beach seine samples only.					
Male	0.0	38.0	19.0	0.0	57.0
Female	0.0	33.0	10.0	0.0	43.0
Combined	0.0	71.0	29.0	0.0	100.0
Estimated Escapement[c]	0	36,856	15,054	0	51,910
1987 commercial sample size:					
Male					
Female					
Combined					
Commercial Harvest[b]					

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Appendix D-7. (continued)

1987 escapement sample size: 467					
Beach seine samples only.					
Male	0.0	37.3	30.2	0.0	67.5
Female	0.2	22.3	10.1	0.0	32.5
Combined	0.2	59.5	40.3	0.0	100.0
Estimated Escapement[c]	81	22,503	15,218	0	37,802

a he total years of life at maturity are represented by the follow European salmon age designations. European age designate the number of fresh water and marine annuli, respectively.

b Allocations by age class based on that years commercial catch sample results.

c Allocations by age class based on that years escapement sample results. Escapement estimate based on the Goodnews River salmon counting tower project.

d Preliminary data.